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Research into the Development of Voice Assessment in Music Therapy

Sanne Storm

Dissertation submitted for
the Degree of Doctor of Philosophy

Supervisors:
Professor Tony Wigram
Professor Lars Øle Bonde

Department of Communication and Psychology - Faculty of Humanities
Aalborg University
Denmark
2013
Declaration

I confirm that this thesis and the research it presents has not previously, in part or in its entirety, been submitted for examination at an academic institution of higher education in Denmark or abroad.

__________________________
Sanne Storm
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Dedicated to Tony Wigram
First of all I would like to warmly thank the six participants in this study for their willingness to contribute their voices to this project. Without them sounding there would have been no project.

Then I would like to thank my supervisor, Tony Wigram. From the very first moment I introduced and spoke to Tony about the idea of constructing a voice assessment profile he supported it fully and expressed a solid trust in it. He offered me tremendous support, inspiration and commitment. In the many discussions and reflections we have had about the human voice, therapy related voice work, and my observations in clinical practice, I always had the sensation that he could see beyond. He trusted my clinical sensations for voice work far more than I trusted it myself. I am forever grateful to him for that. We furthermore shared a passion for assessment profiles and the value of music descriptions as specifications of the therapeutic process. It was very sad and a great loss when Tony passed away in June 2011.

This dissertation is dedicated to Tony Wigram, in the hope that it will further his pioneering efforts to bring music therapy assessment profiles to the forefront of music therapy theory, research and clinical practice.

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USB-Memorystick attached in the back of the dissertation
The voice is a thing of life. We shout against fires and so on, against the wind and the waves. The voice shows energy.

Miyamoto Musashi ¹)

¹) Musashi, 1974, pp 79
1. Introduction and motivation

There are several reasons and motivations for my doing research into the development of a Voice Assessment Profile (VOIAS). They are all related to and spring from clinical practice and being a member of an interdisciplinary treatment and clinical assessment team at Tórshavn Psychiatric Hospital, Faroe Islands. At the same time body- and voice work represent areas of special interest to me and constitute methods I often apply to my clients’ needs.

1.1 Being part of an interdisciplinary team

As a music therapist I, as well as the psychologists of the team, represent a humanistic approach to psychiatric problems, while the psychiatrists still, in many places, primarily employ a medical approach in treating psychiatric problems. These are two very different approaches and ways of understanding psychiatric problems. However the vision of Tórshavn Psychiatric Hospital is to offer a “holistic and patient-centered treatment”. On a regular basis clinical assessments, diagnoses and treatment plans are carried out, and in doing so these two cultures / approaches have to work together and complement each other. As a member of the interdisciplinary treatment- and assessment team, and in the service of the clients, I subsequently both have an interest and a responsibility in promoting a cooperation and understanding across the professional fields which constitute the interdisciplinary team.

The conditions for me to perform the task are presently optimal, because of my position at the psychiatric hospital in Tórshavn, and because it also is expected of me to write a report or a conclusion of the music therapy session as well as the clinical assessment in the medical file.

However, I sometimes find it very difficult to communicate in a concise form what I as a music therapist can offer, and what seems to help the client in the method chosen for treatment. In addition, I often have to describe in words what occurs in therapy over time within the musical interaction between the patient and the music therapist or when applying the human voice as a primary instrument. The communicative challenge in describing what takes place in therapy here has been an ongoing inspiration for me and has motivated me to develop a voice assessment profile. A profile where the purpose of the profile is to support my communication of important observations in a way which can be easily understood, where the psychological interpretations make sense to the interdisciplinary team, and at the same time clarify how and what musical events supported this therapeutic process. In other words my ambition is to develop a tool in a “language” which bridges my field with the field of the interdisciplinary team.
1.2 To be understood and heard - building bridges
If I want to ensure that I am heard and understood by the interdisciplinary team, and to be able to document and communicate a possible change over time in the music therapy treatment, considerable thought must be given to the communication process, and to the design, style and nature of the tools used to carry out our test and evaluation reports. As such, it must be recognised that there is a need for building bridges between the different fields and professions in the interdisciplinary team; - building bridges between our understandings and approaches of psychiatric problems and procedures. However, it is also my experience that it can be challenging to overcome the many differences between professionals working in psychiatry. When building bridges in this context, I personally find it crucial to live up to the vision of placing the human being in need of our service at the center, as we have a vision of doing at Psykiatriski Depilin in Tórshavn. The music therapy training program in Aalborg, Denmark, has always been very aware of the topic mentioned above, and trained its students intensively to be aware of it (Wigram, Pedersen & Bonde 2004). Personally I also find that the identity and self esteem of music therapists grow out of the language chosen to present our work. David Aldridge (1999) addressed this in his article “Personal Opinion: Developing a Community of Inquiry”, suggesting that music therapy build bridges between the fields of natural science and humanism, with emphasis on the problem of language. The languages of medicine, psychology, anthropology, sociology or musicology are highly diverse. Tony Wigram (2000) pointed out that we in our language and way of communicating ourselves may be more “therapists” than “music therapist”, thus having a tendency to forget what our colleagues in the natural science professions regard as our strength; - the music. Therefore, when communicating with other professionals, we must develop a language that can define as well as describe what musical events we base our interpretations upon, in a clear and understandable way. Our profession includes elements from many different fields, and as such we must be conscious about how we as music therapists balance our approach and interpretation, and how we communicate this to our colleagues. This discussion is not the focus of the present study. However, this consideration constantly influences my approach to the human voice and the topic of this study.

1.3 Producing valid empirical evidence of music therapy’s effectiveness
The discipline of clinical psychology has several assessment / test tools employed for the evaluation of cognitive ability, such as the Wechsler Intelligence Scale for Children (WISC), and tools for the assessment of personality, such as the Minnesota Multiphasic Personality Inventory (MMPI) and the Rorschach ‘InkBlot’ test, which are applied to undertake a more precise clinical and / or psychometric evaluation. These psychological testing tools follow certain procedures and require a systematic way of administering them, and they have been trialed for validity and reliability, as well as standardised on specific populations. Music therapists must develop tools parallel to these, with the aim of presenting our clinical evaluation of the clients’ psychological states, therapeutic development over time, and observations in the evaluative process of determining their primary needs and strengths. Such tools can serve to produce empirical evidence supporting the use and effectiveness of music therapy in treatment, or they can document change over time according to the principles of evidence-based practice (Wigram 2000). Tony Wigram writes:

“Because music therapy has developed theory out of empirical practice, attention to the importance of assessment has been limited. But the indicator for a therapeutic treatment in other professions relies on effective and systematic assessment (…) There are many different forms of assessment we should be developing at a more scientific level to establish reliability and validity (…) As I trained in both psychology and music therapy (…) I can see the value and the difference between these two different methods of investigation.” (Wigram 2000, pp 77)
This will further help to clarify how music therapists, as members of an interdisciplinary team, might contribute to a comprehensive and more holistic clinical evaluation. In traditional medical fields such as psychiatry this is what is needed if we want music therapy to be acknowledged as a valid treatment modality. Wigram further writes:

“I propose that in order to advance our ability to provide more specific evidence of what happens in music therapy in order to substantiate our interpretation of behaviour and changes in behaviour, analysis of music is a natural starting point to formulate criteria for systematic assessment. This can also provide a more reliable and substantive body of evidence in the required interface between the humanistic approach and our colleagues from the natural sciences.”

(Wigram 2000, pp 79 - 80)

1.4 The Human Voice and assessment
My interest in applying body- and voice work goes a long way back and was encouraged very early when as a music therapy student I had two personal key experiences with body and voice work.

The first key experience was in a voice workshop with the Italian music therapist Gianluigi di Franco, and the second was in a voice workshop led by Carol Mendelsohn, Centre Artistique Roy Hart.

In both cases, the key experience enabled me to hear how my voice opened itself up and suddenly sounded fuller, richer and more alive. The body sensation connected to and following this transformation was also abundantly clear. I felt my body was vibrating, empowered and full of renewed vitality. Formulated in a more poetic way I had in both cases an experience of singing myself more alive. These two experiences set off my interest in applying body- and voice work in a therapeutic setting. I experienced this sensation of mind and body being strongly connected in a simple and clear way.

With curiosity and enthusiasm I started to
study the work and the healing power of the human voice more closely. In this work it quickly became clear to me how I listened with my ears, noticed the sensations in my body, as well as the experience of different emotions, while my mind was simultaneously creating different types of imagery. All this was happening in the moment. I clearly experienced an inner dialogue happening between the different aspects in my process moving towards a more balanced and centred sensation and expression of myself. Everything happened through sounding. This “listening” approach will later in the dissertation be presented and defined in more detail and play a very central role in this work.

While studying music therapy I approached the “listening” phenomenon twice. First on my own, and here I ended up with a first draft of selected vocal parameters in a voice assessment sheet (See appendix 1). The second time a fellow student, Stephan Skov, and I took this first draft a step further, and formulated a protocol (first draft) on how to assess the different vocal parameters (second draft), and how to score the vocal expression of four non-clinical men and four non-clinical women (See appendix 2). The results of this pilot study were encouraging, and therefore I tried to score and interpret a clinical vocal expression of one psychiatric patient in my master thesis. I did not use the protocol to assess the vocal parameters, but scored the vocal expression of the client singing a song (see appendix 3). This analysis and interpretation was triangulated, and in this way the results were validated (Storm 2002). This last step was important for me, because at this stage in the process it became clear to me what value such a profile could have in clinical practice, including the communication of a client’s state of being to the interdisciplinary team. It was also in this same period that I started applying body and voice work with clients in psychiatry, and especially in the client population suffering from depression. Here the listening perspectives functioned both as directives for what kind of vocal as well as body exercises I could apply to facilitate further personal development, and as a way of collecting information regarding the clients’ present state of being. In addition, the listening perspectives were introduced to the client as a method for coming closer to oneself, and to stand by oneself.

My clinical experience also illustrated that it is noticeably audible if a client is suffering from depression when listening to the expression of the human voice. However, it also became clear to me that both the protocol and the vocal assessment profile required more comprehensive research in order to determine its possibilities and potentials.
One can go as far as to say that vocal expression is a record of the history of mankind as well as a record of the individual.

Paul J. Moses 1)
2. Literature review

Introduction.
As clarified in chapter 1, my motivation for this research study is to do research into the development of a voice assessment profile within music therapy. However, already a preliminary literature search showed that no such profile within music therapy existed, and only very sparse research within music therapy focusing on and involving the human voice. The impact of this discovery was that I had to construct such a voice assessment profile as well as the procedures around it myself. Therefore I have focused the literature review on gathering information about possible vocal parameters, and selecting and defining these in order to build a quantitative profile for evaluating the human voice in music therapy. Furthermore, I have found it important also to look into clinical literature focusing on the human voice as a primary instrument within music therapy, as well as reviewing very focused studies of the voice in other fields and professions outside music therapy.

Because my clinical experience, as mentioned in chapter 1, involves applying therapy related to body and voice to clients suffering from depression, this will be the focus of client population. Relative to the following literature review I will start by presenting the research questions, followed by a description of my search procedure and a presentation of the structure of the literature review.

2.0.1 The research questions
The study examines the possibility of developing a voice assessment profile (VOI-AS), which is able to document change over time according to the principles of evidence-based practice in a valid and reliable way (Wigram et al. 2002), as well as provide relevant information for clinical music therapy practice and the interdisciplinary teams. The study is an investigation of the following research questions, divided into two main questions and five sub-questions:

Main research questions:

1. What constitutes a valid and reliable voice assessment tool for clinical music therapy practice?

2. Can this voice assessment tool be used to evaluate change over time?

Sub-questions:

1. How can relevant vocal parameters for a voice assessment tool be identified and operationally defined?

2. Can inter-rater / assessor agreement be obtained to ascertain consistent outcomes in application?

3. What guidelines are necessary for assessors to undertake a systematic and consistent evaluation?
4. What are the potentials and limitations of a vocal assessment tool?

5. Will the assessment / voice assessment analysis provide valid and reliable data when applied in clinical practice?

2.0.2 Procedure of the literature search

The search procedure involved the examination of existing assessment and evaluation tools within music therapy and identifying these including the human voice in their profiles, and those in the literature review. Since the literature regarding voice and assessment within music therapy is sparse the search for literature furthermore involved an examination of descriptions of working methods and research focusing on the human voice in music therapy. However, even within this broader area the literature within music therapy is sparse. Therefore I expanded my search and investigated other fields and professions, outside music therapy.

It appears that in the area of speech and language therapy there is a wide range of tools that can be applied for many different vocal pathologies, in order to collect data and to analyse language and communication. It was considered unrealistic and unnecessary to make a general review of this field, as the objective of this study is the development of a tool specific to music therapy. Therefore my search strategy in other fields and professions on vocal assessments was focused on profiles related to psychiatry, to voice work as psychotherapy, and to research within affective science and vocal expression. It appeared that also this literature was sparse. In most of the texts identified the distance to music therapy and psychological interpretations of vocal expressions was far, and these texts were therefore dismissed. Very little was found connected to the singing voice, evaluation and psychological interpretations. The existing literature was primarily related to the speaking voice.

In the literature search the following keywords were used in various combinations: “voice”, “vocal”, “measurement”, “assessment”, “evaluation”, “analysis”, “perception”, “parameter”, “psyche”, “quality”, “emotion”, and “depression”.

My literature search was based on the databases of the National Library of Medicine, National Institutes of Health, Medline/PubMed/Elsevier/SciVerse Scivencedirect, and a number of voice journals. Whenever I found relevant articles focusing on vocal expression, emotion and measuring, evaluating, and assessing, I looked up suggested related articles, and searched within the search result group. Furthermore I always studied the literature references of the most relevant articles in the search for more relevant literature. In that way I could identify the key researchers within the field of speech communication, vocal parameters, and emotion.

The literature review will begin in section 2.1 with a discussion of the assessment tools and evaluation protocols in general. Then follows a review of research on the use of the voice within music therapy in section 2.2. Section 2.3 concerns research from other fields and professions focusing on communication of emotions in vocal expression. Section 2.4 presents a review of assessment tools in music therapy where the voice is considered. Section 2.5 focuses on reviewing literature about voice work in clinical music therapy, followed by a review in section 2.6 about voice psychotherapy and evaluation in clinical practice from other fields and professions. The literature review ends with an overview of the vocal parameters identified in the literature.

2.1 Assessment tools and evaluation protocols in music therapy in general

Two music therapy journals have had a special edition focusing on assessment tools within music therapy. In 2000 Music Therapy Perspectives and Journal of Music Therapy published a special issue “Assessment in Music Therapy” with several articles addressing music therapy assessment within different areas. However, none of them focused on the human voice as an instrument, nor did they include vocal parameters describing the
quality of the human voice. The few parameters mentioned were connected to musical skills such as pitch matching and singing with accuracy according to a known melody.

Further Sabbatella (2004) wrote an article in 2004 titled “Assessment and Clinical Evaluation in Music Therapy: An Overview from Literature and Clinical Practice”. In this article she concluded that assessment and clinical evaluation in music therapy are increasingly addressed as a topic of research from a theoretical and methodological perspective. However, she also concluded that there is not substantial literature available specifically on theory and method of assessment and clinical evaluation. Her review was based on papers published between 1985 - 2001.

According to Sabbatella and Wigram authors mostly address clinical assessment and evaluation of clients. However, in order to assure quality of how clinical music therapy practice is evaluated, there is a need to address methodological processes in music therapy evaluation; processes such as data collection, data categories and measurement, areas of evaluation, interpretation and reports, relation between assessment and evaluation, and evaluation of treatment effectiveness (Wigram 1999, 2002; Sabbatella 2004). Wigram et al. (2002) presents an overview of how data has been collected in assessment and evaluation, in order to make evaluation in different forms (See table 1) of assessment and evaluation.

In a literature search a variety of assessment tools in music therapy were identified, most of which were developed in relation to a specific population. An overview is given by Wigram (2000) and Wigram et al. (2002) with focus on various aspects of evaluation and assessment scales where a few also mention voice as a parameter for evaluation in their profile. These will be reviewed later in this chapter.

Consequently there is a rather individualised approach to the application of assessment methods, where many rely on subjective interpretation. There are very few “general” models of assessment or “standardised” models (Wigram et al. 2002). A significant weakness in this discipline is the lack of a well-tried, protocol driven tool that has been found to achieve internal and external validity and reliability.

Moreover, I can only agree with Wigram (2000), that very few assessments and evaluations profiles are concerned with using the musical data as an essential foundation and starting point in explaining psychological, pathological and emotional behaviour (Wigram 2000).

In connection to the human voice the literature is also sparse and lacking in both methodological rigour and clinical application. In order to lay the foundation for the development of a voice assessment profile in this study, focus in the literature review is on existing assessment tools where some connection are made to the human voice. These are reviewed in order to determine their orientation and whether they can inform the proposed assessment profile in this study.

<table>
<thead>
<tr>
<th>ASSESSMENT MODEL</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic assessment</td>
<td>To obtain evidence to support a diagnostic hypothesis</td>
</tr>
<tr>
<td>General assessment</td>
<td>To obtain information on general needs, strengths and weaknesses</td>
</tr>
<tr>
<td>Music therapy assessment</td>
<td>To obtain evidence supporting the value of music therapy as an intervention</td>
</tr>
<tr>
<td>Initial period of clinical assessment in music therapy</td>
<td>To determine in the first two to three sessions a therapeutic approach relevant to the client</td>
</tr>
<tr>
<td>Long-term music therapy assessment</td>
<td>To evaluate over time the effectiveness of music therapy</td>
</tr>
</tbody>
</table>

Table 1: Forms of assessment and evaluation (reproduced from Wigram et al. 2002, pp247).
2.2 Music therapy research on the use of the voice

Very little research has been done in music therapy with focus on the human voice and how it sounds when vocalising. Felicity Baker (2004)\(^1\) completed a research study examining the effects of a song-singing program on the affective speaking intonation of people with TBI (Traumatically Brain-Injured) in which people who were presented with monotonous voices. Baker demonstrated through her study the role that changes to voice range, vocal control and mood played in facilitating improvements in affective intonation. Baker’s study describes and defines in detail what affective intonation refers to, which comes more close to what this study is interested in, namely vocal parameters. In defining affective intonation Baker refers to Perkins, Baran, and Gandour (1996), and she describes how affective intonation refers to the melodic contour of the voice that typically reflects the mood state of the speaker, - an overall shape of the rises and falls in pitch over time in a spoken phrase. (Baker 2004) The contours comprise several components such as pitch height – first fundamental frequency / the most frequently occurring pitch, second frequency range – the entire range of frequencies used over a given intonation contour, third slope – in Baker’s study the pitch changes are described as having steep or flat slopes, and finally frequency variation – the variability present in the intonation contour where low pitch variability are indicative of a flat and monotonous speaking voice. (Baker 2004)

In her study Baker took measures pre- and post each session, and measured the variables of the clients speaking fundamental frequency, standardised variability and slope, pitch range, pitch-matching accuracy and mood. She subsequently developed a program of exercises incorporating this by singing pitch range, expression in intonation, melodic pitch matching and visual analogue mood scale. When assessing pitch range the client was asked to sing the lowest pitch possible without being cued by the music therapist. Then the music therapist played the note one semitone lower on the piano and asked the client to try to sing this note. The process was continued until the client was not able to produce any sound. Then the upper range was assessed in a similar way just moving in the opposite direction until the client was not able to produce a sound. When assessing expression in intonation the client was asked to read aloud four different sentences, each expressing one mood. The four different moods were happy, sad, angry and afraid. When assessing pitch matching accuracy Baker had different intervals played on the piano and recorded on a compact disk so it could be played to the client. These intervals were played to the client twice and then the client was asked to reproduce the intervals.

This research demonstrated the value of song singing, but not vocal improvisation and spontaneously expressed exercises. Three voice parameters can be identified in Baker’s study: pitch range, fundamental frequency and pitch accuracy. Fundamental frequency however was not in connection with singing, but speaking a phrase. In my research study I am interested in assessing how the clients spontaneous use her or his voice when vocalising in different situations. However these three vocal parameters seem to be basic parameters.

The exercise Baker used to assess pitch range is a very well known exercise to expand the pitch range in a singing teaching lesson as well as using the glissando movements from the very lowest possible note to sing moving to very highest possible note. I consider both exercises useful and reasonably neutral in function in not making the client too excited about performing a satisfactory sound material. However, the vocal parameter pitch accuracy in Baker’s study is assessed in a very musically oriented way and the exercise itself can make the client unsure when reproducing the played interval. In pitch range what I am interested in is not pitch range available but the pitch range used spontaneously, and concerning pitch accuracy I am more interested in the sounding and resonating of a spontaneously chosen tone than how accurate it is sung.

\(^1\) Felicity Baker is an associated professor, program director in music therapy and Director of Research at the School of Music at the University of Queensland, Australia.
Baker’s study represents the most recent in a very small number of studies concerned with analysing vocal parameters specifically in connection with music therapy sessions. It builds on previous research, and incorporates the most relevant material from previous studies. The method of analysis is a complex graphic analysis of vocal contour, range and many other parameters. For research purposes, this served well to determine any change over time. However, as an everyday tool for clinical analysis, the measures used in Baker’s study do not lend themselves easily to clinical practice. From that perspective, and building on the theoretical perspectives, clinical applications and research studies described above, the aim of the present study is to focus on the development of a valid and reliable means of assessing vocal output in clinical and non-clinical subjects.

2.3 Research from other fields and professions focusing on communication of emotions in vocal expression

My search strategy in other fields and professions focused on profiles related to psychiatry, to voice work as psychotherapy, or research within affective science and vocal expression.

As key and central researchers within the field of speech and communication of emotions in vocal expression and affective disorder the (music) psychologists Klaus Scherer 2) and Patrik N. Juslin were identified 3). In the following I will, with focus on emotions and affective disorders, review central themes relevant for identifying possible vocal parameters.

Communication and perception of emotions

2) Scherer is the director of the Swiss National Research Center in the Affective Sciences in Geneva, and a specialist in the psychology of emotion. He has for several years written many influential articles on emotions and vocal expression, and edited several books concerning the research conducted within non-verbal behaviour, communication and emotions.

3) Juslin is a professor of psychology at the Department of Psychology, Uppsala University, Sweden, where he directs their research and teaching in music psychology. He has published numerous articles in the areas of expression in music performance, including vocal performance, emotional responses to music, music education, and emotion in speech.

When a communication occur it implies (a) a socially shared code, (b) an encoder who intends to express something particular via that code, and (c) a decoder who responds systematically to that code. Studying non-verbal communication includes focusing on (a) the content, (b) accuracy of how well it is communicated, and (c) the code usage, how it is communicated. (Juslin & Laukka 2003)

Focusing on non-verbal communication vocal and musical expression has something in common. A comprehensive review by Juslin and Laukka (2003) revealed similarities according accuracy with which discrete emotions were communicated to listeners as well as the emotion-specific patterns of acoustic cues used to communicate each emotion.

Both Kaiser & Scherer (1998) and Juslin & Laukka (2003) remark that research on vocal cues might implicate instruments for the diagnosis of different psychiatric conditions, such as depression and schizophrenia.

It is therefore a basic assumption that there is a set of objectively measurable voice cues that reflect human affective states. In an effort to identify acoustic cues used in emotion inference from voice, many studies within speech have been carried out where actors have portrayed emotions by producing standard utterances like numbers, letters of the alphabet, nonsense syllables, or standardised sentences. However, it is important to bear in mind that most of the research studies described concern actors portraying certain emotions, and then a group of people decoding the vocal expression. Studies using...
natural speech samples are very few (12 studies out of 104), and out of these two studies are concerned with clinical practice, actual therapy sessions (Juslin & Laukka 2003). Another review of vocal indicators of affective disturbance done by Scherer (1987) represents as he put it himself “the scraping of the barrel” (Scherer 1987, pp 64). The review describes 24 studies, and many of these studies used very few patients. In 11 studies out of 24 the research study is solely based on one with maximum 4 clients / participants. For a more comprehensive review of studies related to vocal expression and emotions, as well as assessment of affective disorders read Scherer (1981, 1987, 2003), Johnstone et al. (2000), Juslin & Laukka (2003) and Juslin & Scherer 2008).

This discovery was quite a surprise to me considering the long history of interest there is into the human voice as something worth studying in connection with emotional expression and evaluation of a human being’s psychological state. The reason for this may be the difficulties in analysing acoustic cues or the difficulties in designing a suitable research setting (Juslin & Scherer 2008).

2.3.1 Vocal cues
When portraying a certain emotion and even a certain variation or intensity of an emotion, the characteristic acoustic patterns for this emotion follow the same pattern. The degree of recognition accuracy is impressive, given that some of the studies include emotions such as love, pride, or jealousy. The emotions that have the highest accuracy in being recognised are sadness and anger, followed by fear and joy, which all are basic emotions (Scherer 1995, Juslin & Laukka 2003).

Table 2: A synthetic compilation of the review of the empirical data on the acoustic patterns that characterise the vocal expression of basic emotions portrayed by actors (reproduced from Scherer 2003, pp 233).

<table>
<thead>
<tr>
<th></th>
<th>Stress</th>
<th>Anger/rage</th>
<th>Fear/panic</th>
<th>Sadness</th>
<th>Joy/elation</th>
<th>Boredom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
</tr>
<tr>
<td>F0 floor/mean</td>
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<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
</tr>
<tr>
<td>F0 variability</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
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<td>¥</td>
</tr>
<tr>
<td>F0 range</td>
<td>¥</td>
<td>¥</td>
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<td>¥</td>
</tr>
<tr>
<td>Sentence contours</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
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<td>¥</td>
</tr>
<tr>
<td>High frequency energy</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
</tr>
<tr>
<td>Speech and articulation rate</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
<td>¥</td>
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</tr>
</tbody>
</table>

Johnstone and Scherer’s (2000) have summarised conclusions in synthetic form based on a comprehensive review of the converging evidence with respect to the acoustic patterns actors find which characterise vocal expression of major modal emotions (see Table 2). The identified voice cues are Intensity, fundamental frequency (F0), sentence contours, high frequency energy and speech rate. Within fundamental frequency the mean/floor fundamental frequency, the variability of fundamental frequency when addressing different subjects, and the pitch range of the verbalization are investigated.

The table shows that when expressing sadness all voice cues decrease, while all voice cues increase in fear/panic. Both emotions may be present when experiencing a depression. (Intensity is the volume of the speaking voice, F0 floor / mean is floor / mean fundamental frequency, F0 variability describes how the fundamental frequency changes according to the subject of the speech, F0 range is the pitch range of the speech.) The specific voice cues and their relation to emotion will be further described and discussed later in this section.

2.3.2 Additional vocal cues
The music psychologist Johan Sundberg (1987)4) points out that the emotional state can be revealed in how the voice is used in speech and singing by studying the pitch contour, and the duration of various syllables, and the overtones (formant structure and

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4) Johan Sundberg (born 1936), Ph.D. musicology, doctor honoris causa 1996 University of York, UK) occupied a personal chair in Music Acoustics at the department of Speech Music Hearing, KTH and founded and was head of its music acoustics research group until his retirement in 2001. His research concerns particularly the singing voice and music performance.
spectrum) of different vowels, and in other aspects of speech. One parameter is the pattern of phonation frequency and breathing pattern. Sundberg points out that most muscle activity typically would be minimised in sadness and depression, because then people are not really in a condition to express themselves by means of wild gestures, and therefore movements will be minimised. This affects the sound of the voice in that speech tempo is decreased and the voice source is bereft of overtones. (Sundberg 1987)

2.3.3 Vocal expression and affect
The relationships between voice and affect have been further examined in several studies. The studies take into consideration that human vocalisation is produced by the joint action of respiratory, phonatory, and articulatory processes. Juslin & Scherer (2008) has come to the conclusion that a vocal expression can be characterised on three different levels:

- physiological level (describes nerve impulses or muscle innervation patterns that form the basis of the action of the structure involved in the voice production process.)
- phonotory - articulatory level (describes the position or movement of the major structure involved, such as the vocal folds.)
- acoustic level (describes the characteristics of the speech wave form emanating from the mouth.)

The effects of emotional arousal on the vocalisation process are primarily controlled by the limbic system. They are generally produced via tonic activation in the somatic nervous system (in particular the striated musculature) and sympathetic as well as parasympathetic activation of the autonomous nervous system. In addition, direct sympathetic or parasympathetic effects such as respiration changes and the secretion of mucus can affect the production of the vocalisation. (see Figure 1)

Scherer does not differentiate between speech with the intention of expressing a specific emotion and emotions evolved spontaneously. I agree that when a person intentionally wants to express a certain emotion it follows Scherer’s figure. However I am of the opinion that a certain situation can affect an arousal, which affect the body and voice, and then far later consciously is defined as a specific emotion. One example of this could be anxiety. Therefore I would add a two way process in Scherer’s figure.
2.3.4 The push- and pull-effect

Because of the manifold processes in vocal expression, even small changes in physiological regulation will produce variations in the acoustic patterns. It would then be easy to conclude that acoustic patterns automatically occur and only mirror emotion-produced changes of the internal physiological system. However, in connection with speech and communication, besides the basic emotion, there also may be an underlying emotion present in the interaction, which also is being mirrored in the vocal expression and characteristics. Scherer defines this as a push- and pull effect. The push effect involves various physiological processes, such as respiration and muscle tension, which are “naturally” influenced by emotional responses, whereas the pull effect reflects external conditions that may lead to processes involving how you present yourself in present social interaction. (Scherer 1995, Juslin & Laukka 2003, Juslin & Scherer 2008).

There can be little doubt that the vocal musculature is a highly sensitive instrument likely to be strongly affected by changes in affective state, as well as the social context - interaction. Therefore it is important to develop an understanding of the underlying psychological and physiological processes in connection with voice expression. Underlying emotion processes have an important impact on the vocal expression and the characteristics of the voice (Scherer 1987, 2003, Juslin & Scherer 2008).

2.3.5 Difficulties in choosing the proper methodology for measurement

Scherer clarifies a large number of problems due to the difficulties of sampling patients, speech and voice utterances, and choosing the proper methodology for measurement. Scherer asserts that vocal measurement has an important role as a central pillar in the behavioural measurement of affective disorder.

There is still no clear theory of how the different layers collaborate and no research exists which looks into this area. The research to this date is more concerned with identifying voice cues, which can be scientifically and reliably measured, and link what is acoustically possible to measure and contribute a psychological perspective to the analysis.

2.3.6 Voice cues and the acoustic measurement in clinical practice

During the years only a limited number of acoustic cues have been studied, and the arousal differences, the underlying emotions, within the basic emotion have been neglected (Scherer 2003). Whereas the process of decoding emotions from voice cues among listeners seem to be accurate, it on the other hand seems necessary for scientists to reach beyond single measures of the most common voice cues (Juslin & Scherer 2008).

Juslin & Scherer (2008) broadly divide voice cues into four main categories:

- fundamental frequency (F0)
- voice intensity
- voice quality
- temporal aspects of speech

Different measures can be obtained for each of these four types of voice cues.

The most common and most analysed voice cues are speech rate, fundamental frequency and voice intensity. The reason for this may be the difficulties in measuring and interpreting the cues up till now where software is developed and can be proposed. Voice cues like pauses, formants, glottal wave form and rhythm have received little attention though they are also considered to reflect the vocal affect expressed. (Juslin & Scherer 2005)

The selection of voice cues to analyse is very dependent on the goal of the study. Juslin & Scherer (2005) have outlined and defined the most important voice cues (see appendix 5).

2.3.7 Voice cues and affective disorders.

Depressed speech has often been characterised as dull, monotone, mono-loud, lifeless, and metallic. These perceptual qualities have been associated with acoustical features like fundamental frequency (F0), amplitude modulation (AM), formant structure, power distribution, speech rate (pause frequency and duration), and jitter (Breznitz 1992, Scherer 1995, France et al. 2000)
Focusing on depression Scherer (1987) reviewed all published research which studied vocal indicators of depression. This included research which according to Scherer did not meet the minimal requirements for serious empirical research. He looked into those anyway, because studying vocal tendencies in depression may provide relevant information. In Scherer’s list 24 research studies between 1930 and 1984 are mentioned, and according to Scherer many of these studies used very few patients, in some cases only one. The aim of the studies is very different, and varied from symptom description, differential diagnosis, state change to change after therapy, which also determined the voice cues tested, and how. It is also notable that the equipment for measuring voice cues is improving with time.

With respect to F0, most studies have reported a rather low mean F0 for depressives in relation to normals, or decreased F0 in an acute state of depression, although there are reports of an increase in F0 with the severity of depression (review by Scherer 1987). The opposite pattern was found in studies on vocal changes following therapy. Most studies have discovered a decrease in F0 after therapy or during positive mood states. Only one study suggested an increase in F0 and no significant effects were noticeable in two other studies (review by Scherer 1987). The discrepancy in the results may be explained by the fact that in most studies no clear distinction between manic and depressed states was made (Scherer 2003). In a large-scale longitudinal study of depressive disorders, Ellgring and Scherer (1996) showed, as predicted, that an increase in speech rate and a decrease in pause duration is a powerful indicator of mood improvement in the course of therapy (remission from depressive state). The study involved 11 females and 5 males. For F0 there were interesting sex differences. In female, but not in male patients, a decrease in minimum fundamental frequency of the voice predicted mood improvement. Scherer suggested that these differences might have been due to differences in the emotions underlying depression. (Ellgring et al. 1996)

**Summary:** potential and relevant voice cues
Fundamental frequency (F0), pitch range and spectrum are mentioned, but it is only described from a voice technical point of view. The fundamental frequency is the only parameter related to the psychological state and emotions.

The study of emotional cues in human speech can provide a solid framework for the exploration of emotional cues in singing/music. The various acoustic parameters related to speech can be adapted to music: fundamental frequency relates to pitch and melody, intensity relates to dynamics, the formants relate to timbre, and speech rate / transition time relates to rhythm / duration.

However there are important differences to take into account from this literature review. One is that it is focused on speech and research where verbalisation is analysed. Another is that most of the studies are based on actors and singers interpreting a piece of text or music which expresses the sadness, the depression mode, while very few are based on clinical practice employing a protocol. This confirms that present study is highly relevant.

### 2.4 Assessment and evaluation tools in music therapy where the human voice is considered and mentioned

**Introduction:**

The review of assessment and evaluation tools in music therapy shows that only two music therapists have considered and mentioned the human voice, namely Juliette Alvin and Roy Grant. However I have also found it relevant to review Bruscia’s Improvisation Assessment Profiles (IAP) although Bruscia’s IAP do not include or mention anything specifically concerning the human voice. The reason for including IAP is that Bruscia’s model is internationally recognised and used. It is also the most comprehensive and general model within music therapy. In addition, it is not focused towards a specific client group or choice of instrument.

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5) In 1987 Scherer published and article, *Vocal assessment of affective disorders*, presenting an overview of these studies in a table (Scherer 1987, pp 66 - 67).
2.4.1 Assessment in Free Improvisation Therapy.

Juliette Alvin was one of the pioneers in music therapy practice and education. She developed Free Improvisation Therapy, a foundation model for improvisational music therapy. She also formulated a descriptive approach to evaluating the effect of music and music therapy, including evaluation of listening responses, instrumental responses and vocal responses. The assessment and evaluation relied essentially on musical data. The approach to assessment and evaluation developed from a need in clinical practice to determine the client’s ability to form various kinds of relationships and his/her level of development in the physical, intellectual, and social-emotional domain.

Alvin’s clinical applications, approach and method can be described as eclectic. She mainly worked from a humanistic and developmental point of view, but also employed a more analytical perspective. She believed the therapist’s instrument was his/her primary means of communication and interaction.

Alvin built her theory on the primary statement:

“Music is a creation of man, and therefore man can see himself in the music he creates.”

(Wigram et al. 2002, p. 131)

In this statement lies an understanding of an improvisation as a musical and potential space where clients and therapists can improvise freely, without musical rules, structure or themes, and where the music can be an expression of the person’s character and personality through which therapeutic issues can be addressed. Free improvisation requires no musical ability or training from the client and is not evaluated according to musical criteria. (Wigram et al. 2002)

Alvin placed emphasis on the great importance of understanding the physiological affects, linking the psychological effect of music with the physical effect. To fully understand the influence of music within music therapy she was of the opinion that music therapists need to understand human physiology. But this aspect was often ignored because it was not “romantic”, and did not seem to relate to the more important psychological and psychotherapeutic processes in music therapy. (Wigram et al. 2002)

2.4.1.1 Alvin’s general approach to assessment and evaluation.

Bruscia (1987, pp 103 - 107) presents Juliette Alvin’s general approach to assessment and evaluation in chapter eight of “Improvisation Models of Music Therapy”. According to Bruscia, Alvin’s approach to client assessment and evaluation was informal rather than formal, described almost entirely through case material. She did not develop standardised forms, scales, or procedures. Alvin’s assessment and evaluation relied essentially on musical data. Both involved the client in listening, improvising freely on instruments, and singing as the main activities.

To determine the client’s ability to form various kinds of relationships and his/her level of development in the physical, intellectual, and social-emotional domains Alvin analysed the client’s responses within these activities. She observed listening, instrumental and vocal responses formulating various relationships of interest: intrapersonal (between various aspects and parts of the self); object (between self and the physical environment); interpersonal dyads (between self and therapist, parents, siblings, or peers); and groups.

Focusing on vocal responses Alvin observed in what way the client used and related to his/her voice. In the singing activity she observed the vocal activity as it was “played” on any other instrument. Nevertheless, she also addressed that while singing familiar songs the therapist should observe more specific voice parameters like:

- the placement, projection, and quality of the voice
- the control of pitch and intonation
- awareness and discrimination of tonal elements
- memory for melodies and lyrics
- song preferences.
Through Bruscia’s way of presenting Alvin’s ideas of assessment and evaluation a certain procedure in clinical activities and observations takes shape (Bruscia 1987, pp. 75 - 111). The procedure appears as follows, starting with the music and the music instruments as an object, continuing to observation of how the music and the instruments are used in relating to others or environment, ending up by observing the ability of using the music and the instruments referentially and perhaps even symbolically (Bruscia 1987, pp. 91).

These headings ensure a rich collection of data and also indicate the possibility of describing the client very detailed. Additionally, they define different individual aspects of the client to be included in a clinical evaluation and evaluation of the therapeutic process. The procedure and headings define a way of ensuring different approaches of clinical work and ways of observing the individual client. However, since an adequate tool must provide a detailed assessment profile, Alvin’s lists of “responses” are not inclusive enough to be considered comprehensive. They do not define a specific procedure for gathering assessment data that should be followed, or specify different exercises used and presented in the same way every time.

For example, Alvin does not mention any vocal experiences which the clients are supposed to be doing when the vocal parameters are to be assessed. It seems as if she is thinking of the vocal activity in the same way as if the client was using any other instrument. She does not distinguish between the intra-body experience received by singing or making sounds and using her/his own body as an instrument, and the extro-body experience received by holding an instrument physically. The voice parameters mentioned are not all specific voice parameters. The only parameters which could be specifically connected to the human voice itself are placement, quality and control of pitch and intonation. Perhaps Alvin is addressing placement to pitch and not to the body, - quality to minor or major and not to the colour and the human voice itself. Although Alvin describes how she thinks different ways of using the voice can reveal one’s personality, she does not describe these different approaches of using the human voice as a therapeutic instrument. Generally the potential psychological interpretations made from the observations are missing in the description of her general approach to assessment and evaluation. As mentioned before, Alvin’s assessment has not been standardised nor is it systematically applied nationally or internationally. (Bruscia 1987, Wigram et al 2002)

2.4.2 Grant’s music therapy assessment for developmentally disabled clients

Roy Grant developed an assessment profile primarily for use with developmentally disabled clients. In this assessment tool Grant has included a parameter that he terms “vocal skills” (Grant 1995, p. 280). The section of Grant’s test battery concerned with communication skills includes aspects of both receptive and expressive skills. The assessment tool is divided into four areas in which the music therapist can make a contribution to the evaluative process: sensory motor, cognitive (especially in the areas of visual and auditory perceptual skills), communication, and social. In the area of communication skills he defines a rating scale to score vocalisation relative to three levels: non-sing, directional singer, and tuneful singer, which offers criteria to evaluate the vocal skills on a simple but empirical basis. The rating scale provides information on vocal pitch control skills and vocal range. As such, the assessment of vocal expression in Grant’s tool seems to be concerned with the vocal and musical skills of the client. While this section includes definitions of vocal range and pitch control, the descriptors again seem to point towards the degree of accuracy present. Interpretation of communication, or of the vocal expression as a characteristic aspect of a particular pathology is not included in the analysis of musical material.

Grant’s assessment tool has not been standardised nor is it systematically applied nationally or internationally.

2.4.3 Bruscia’s Improvisational Assessment Profiles (IAP)

Professor Kenneth Bruscia (1987, 1994), Temple University has developed and described a method, the Improvisational
Assessment Profiles (IAP), for describing and interpreting clinical improvisations. When developing these he specifically looked for concepts that would give the profiles both specific listening perspectives and a psychological relevance. Bruscia’s approach is qualitative, and oriented from a musical perspective with the dimension of interpretation to musical, psychological and clinical levels. Bruscia’s IAP do not include or mention anything about the human voice specifically. However, his model is the most comprehensive and general model within music therapy. It is not focused towards a specific client group or specific choice of instrument, and I therefore find it relevant to review Bruscia’s IAP. In the following I will give a concise description of the IAP and the process of analysis, and then apply this to the media of the human voice with assessment in mind.

2.4.3.1 The choice of media
As Bruscia mentions, each modality has its own media, materials, and activities which further define and determine its therapeutic applications. According to Bruscia (1987) in music there are three media: voice, instrument and body movement. The basic materials contained in these media are:

- the sound producing object (e.g., voice, instrument, or body)
- the sound vocabulary available through the object
- the musical forms that are created (e.g., composition, performances, improvisations)
- all artifacts or by-products (e.g., scores, recordings).

(Bruscia 1987, pp 515 - 516)

When the object for sound production is the human voice the human body becomes the media. The body creates the vibration, resonates, and gives sensory feedback not only to itself but also to your “Self”6). The body mobilises unseen physical parts and makes these, as well as the psyche, audible. At a very broad level of understanding, you might say the voice makes the internal audible. The voice differs from other instruments by being a living instrument, which is dynamic and influenced by the internal state of being. The sound production in this case is influenced by the physical and psychological state of being. In Bruscia’s own words:

“The body mobilizes the unseen physical self — to sound its inner self — according to feedback from the observing self. As the individual instrument of the body, the voice extends the physical self and projects a sound identity of the inner self. The vocabulary available in the vocal media may include orally-produce sounds that are: pitched or unpitched, sustained or unsustained, speech or nonspeech, words or syllables, consonants or vowels, isolated or sequenced, and functional or expressive. The pitch, intensity, speed, and timbre of the sounds are limited by the physical characteristics of the singer. Vocal activities include making oral noises, humming, whistling, chanting, speaking, singing, and improvising. The resulting forms may be isolated sounds or tones, rhythms, melodies, lyrics, rhymes, songs, and improvisations. These forms may exist as musical images, notated sources, or recordings.”

(Bruscia 1987, pp 516)

Bruscia (1987) also discusses the various modalities of expression communication which are used in improvisation music therapy. He divides the modality into two parts, the “art” and the “therapy”. The “art” modalities that may be used include music, movement/dance, drama, poetry, and the visual arts. The “therapeutic” modalities that may be employed include verbal discussion, play, imagery, and enactment. As an example he refers to the characteristics of a song. A song combines the art modalities of music and poetry, and when used clinically, it also may involve the therapeutic modalities of discussion and imagery. He places Vocal Improvisation Therapy into this definition and further mentions that the “arts” modality here is music, and that the “therapeutic” modalities present are body-work, imagery and discussion. (Bruscia 1987, pp 513 - 514)

It is thus clear that Bruscia understands the art modality in vocal improvisation only from

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6) “Self” here refers to the Psychology of the Self developed by Kohut (1996). In this theory “ the nuclear self” is the “centre” experience of ourselves, which infers that you have an experience of a “self” in the meaning, myself, as something distinct and unique (Siegel 1996)
a musical point of view and this does not exactly address the art modality of the human voice itself. The human voice in itself contains many characteristics such as the pitch, timbre, and intensity connected to the human voice itself, and not only to the music produced with the voice. This gives the "therapeutic" modality the possibility of more levels into the imagery and discussion, as well as aspects of the body's (physical) experiences and physical/sensory awareness. However it would be applicable to analyse some aspects of vocal improvisation through using the profiles, but mainly at an interpretative level, which is why this study is needed to explore and define a more specific and appropriate tool, due to the detail needed on vocal parameters.

2.4.3.2 A presentation of the Improvisation Assessment Profiles (IAP)
The main concepts for description consist of six profiles, which focus upon psychological - as well as musical processes. Connected to each profile is a scale of musical and other various parameters, which enable the person undertaking the analysis to identify the characteristics in specific musical characteristics in relationship to the grades on the profiles. In an interview Bruscia had with Stige in 2000 Bruscia clarifies that his choice of terms for the six profiles was an attempt to find indications that covers both musical and psychological qualities and characteristics (Bonde 2009).

The six profiles each provide a specific area of focus for the assessment:

**Salience** focuses on how certain musical elements are given more salience than others, containing five scales forming a spectrum: compliant, conforming, attending, controlling, dominating.

**Integration** focuses on how simultaneous aspects of music are organised within the spectrum: undifferentiated, synchronised, integrated, differentiated, over-differentiated.

**Variability** focuses on how sequential aspects of the music are related, rigid, stable, variable, contrasting, or random.

**Tension** focuses on how much tension is created within and through various aspects of the music, if it is hypo-tense, calm, cyclic, tense, or hyper-tense.

**Congruence** focuses on the extent to which simultaneous feeling states and role relationships are unengaged, congruent, centred, incongruent, or polarised.

**Autonomy** focuses on what kind of role relationships is formed between the improvisers. If it is dependent, following, partner, leader, or resistor. (Bruscia 1987, 1994)(Wigram et el. 2002)

The different scales are grouped together according to the type of element. Bruscia defines the different scales in this way:

"The Rhythmic scales deal with the pulse, tempo, meter, subdivision, and pattern, and may be analyzed according to figure-ground and part-whole relationship. The Tonal scales deal with the components of modality (scale), tonality, harmony, and melody, and may be analyzed according to figure-ground and part-whole relationship. Musical style is also included in this category. The Texture scales deal with the overall fabric of the improvisation, and are concerned with such elements as pitch, registers, voicing configurations, musical roles of each part, and phrasing. The Volume deals with sound intensity and mass, or what is commonly called “dynamics”. The Timbre scales deal with sound quality, attack, resonance, and instrumentations. The Physical scales deal with the motor action of playing and the various other expressive uses of the body. The Programmatic scales that deal with lyrics, stories, programs, verbal reactions, or interpersonal relationships associated with the improvisation.” (Bruscia 1987, pp 406)

2.4.3.3 The process of analysing
Through the process of analysis, the relationship of the different elements of music is investigated in some detail through these different profiles, and scales of musical parameters are used in order to identify salient and important aspects in music-making. Bruscia recommends therefore a more
phenomenological approach to the use of the scales. Any analysis should be undertaken by using the salience profile first in order to determine which are the salient elements and qualities in the music for subsequent analysis (Bruscia 2001).

Bruscia bases his IAP on two basic assumptions:

1. “(…) that improvised music is a sound reflection of the improviser’s way of “being-in-the-world”, not only in the here-now world for the improvisatory moment itself, but also of the more expanded context of the person’s life-world. In this sense, the IAP are projective. (…) the way a person selects an organizes sounds reflects what his/her psyche and body needs to do at that moment in actual time and personal life history.”

2. “(…) each musical element provides a universal metaphor - or perhaps archetype - for expressing a particular aspect of “being-in-the-world”. (…) the word “metaphor” (…) suggest a “range” of symbolic meanings, rather that a “sign” of a specific or limited meaning. Thus, each musical element has its own range of possibilities for expressive meanings which are different from the other elements.” (Bruscia 1994, p. 3)

The first assumption suggests an analogy between the elements of music and the existential themes and qualities of human existence, while the second assumption suggests the metaphoric interpretations of the musical elements to be based on a psychoanalytical and existential orientation. The analogy and metaphors between musical elements and the existential themes and qualities in human existence represent a core construction in the IAP and is unfolded in the IAP method. Bonde (2009) and Wigram et al. (2002) has presented an overview of the metaphoric interpretation of musical elements on the basis of Bruscia’s psychoanalytic and existential understanding. However, it is not possible to adapt the elements without quite substantial changes in focus and listening perspectives.

As an example the timbre of the human voice is of great importance in giving information about the psychological state of the human being. What are the sound quality and the resonance like? According to the human voice the timbre will differ according to where it is placed in the body. The spectrum of overtones might be rich, or the voice may seem withdrawn or forward. According to resonance this deals with full or minimal resonance of the used sound quality of the human being, and the resonance also is dependent on the tension or lack of tension in the body. So to make it possible to evaluate these parameters of the human voice and gain the information to form an analysis, there is a need for detailed re-definitions of these elements.

2.4.3.5 Critique

The IAP in the way Bruscia has developed them, demonstrate how detailed it can be when defining every single word, element and approach very precisely and clearly. It seems like it has not been easy to translate the IAP’s into Norwegian in a satisfactory way without...
### Parameters and Metaphors Derived from Bruscia’s IAP

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Variability</th>
<th>Tension</th>
<th>Salient Elements</th>
<th>Metaphor of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse/Rhythm/Tempo</td>
<td>- breath and sound</td>
<td>flexible regulation system</td>
<td>the organisation of life energy in time.</td>
<td></td>
</tr>
<tr>
<td>Tonal scales/Melody</td>
<td>- pitch range</td>
<td>a specific model gestalt: metaphor of an emotion being formed and experienced. (langer)</td>
<td>the expression of the self.</td>
<td></td>
</tr>
<tr>
<td>Form/Texture</td>
<td>- register configuration</td>
<td>being = a gestalt, a metaphor of wholeness</td>
<td>being in time/being in space</td>
<td></td>
</tr>
<tr>
<td>Volume</td>
<td>- range of power</td>
<td>metaphor of giving and taking space over time.</td>
<td>the specific quality of being in time.</td>
<td></td>
</tr>
<tr>
<td>Timbre/Harmony/Modality</td>
<td>- spectrum of overtones</td>
<td>the identity of the entity, related to the body area, colour of the voice, metaphor of the basic emotion. spectrum of overtones: a metaphor of an emotion being formed and experienced (langer).</td>
<td>the specific quality of being in space/the specific character of self expression/the organisation of life energy in space</td>
<td></td>
</tr>
<tr>
<td>Body</td>
<td>- change of body and sound coordination</td>
<td>- compression - tense - breathy</td>
<td>the specific quality of being in space/the specific character of self expression/the organisation of life energy in space</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: Parameters deduced from Bruscia’s IAP added a possible salient element and metaphor on the basis of a psychoanalytic and existential understanding.

Having the possibility of discussing with Bruscia regarding this translation. Stige & Erkkilä (www.hisf.no/njmt/index.ssi 2000 - 2005) points out in the web discussion about the IAP that the great complexity of IAP put high demands on the user concerning language skills. Most of the models for analysis of music, and this applies to the IAP as well, focus on describing what we play rather than how we play what we play. This is applicable for any analysis of the human voice as well. There does not appear to be any focus on how the human being expresses what she/he expresses with the human voice. Therefore it is also needed in music therapy to have types of concrete, detailed suggestions for interpretations with focus on how the human beings in music therapy express themselves, and accordingly make detailed suggestions for interpretations according to that. (www.hisf.no/njmt/index.ssi 2000 - 2005)

The IAP is a very complex, detailed and extensive method of analysis, and takes several hours when used as proposed. Relating this to clinical practice this is too time consuming and not at all realistic for a practitioner to find this time. However in music therapy it is essential to have these types of concrete detailed suggestions for interpretations, especially when trying to speak about the meaning of improvisation, music therapy and investigating the development of client(s) within a multidisciplinary team to give valid and reliable information about the client in therapy.

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7) On the website of the Nordic Journal of Music Therapy were ongoing discussions of the so-called Forum from 2000-2005. One of the discussions was “IAP Revisited”. This discussion originates from a part of an interview Brynhulf Stige did with Kenneth Bruscia in November 1999. Many others have contributed the discussion and shared their reflection and experiences with the IAPs or assessment work in the music therapy field in general. To name a few: Gema Bellido, Kenneth E. Bruscia, Jaakko Erkkilä, Katrina Skewes and Tony Wigram. (www.hisf.no/njmt/index.ssi)
2.5 Voice work in clinical music therapy

The human voice is not always an obvious choice as a primary instrument in music therapy. The human voice is the closest and most intimate instrument you can choose as a client and music therapist, and when chosen an awareness towards this and possible implications have to be considered carefully. There are a very limited number of voice pioneers within music therapy who have reported the potential of vocal expression, either through vocal exercises, song, or improvisation, while also describing their working method and theoretical understanding in depth.

However three music therapists are selected and reviewed, namely Diane Austin, Gian-luigi di Franco and Lisa Sokolov. These three have been chosen, because they all have worked out a concrete approach and working method.

However, the balance of the review of each of them is very uneven, because the amount of literature available in each case is so very different. Diane Austin is definitely the one who has written and described her approach and working method the most.

2.5.1 Austin’s “Vocal Psychotherapy”

Diane Austin is a voice pioneer within music therapy, director of The Music Psychotherapy Center and an associate professor in the Graduate Music Therapy program at New York University. She has published several articles and given lectures and workshops widely nationally and internationally. Austin’s doctoral dissertation, “When Words Sing and Music Speaks: A Qualitative Study of In-Depth Music Psychotherapy With Adults” (2004) and her last book, “The Theory and Practice of Vocal Psychotherapy. Songs of the Self” (2008), summarise all her experiences with the human voice as a primary instrument.

Austin’s clinical experience is very much based on work with adults who were traumatised as children. Through work with this client group she has developed a method she has called Vocal Psychotherapy. Austin defines “Vocal psychotherapy” as:

“...use of the voice, improvisation, song, and dialogue within an analytic orientation to promote intra psychic and interpersonal change. Vocal psychotherapy is in-depth music psychotherapy with an emphasis on the voice: speaking, sounding and singing.”

(Austin 2006, p. 135)

The focus is on helping people connect with their authentic selves through Vocal Psychotherapy.

Breathing is an essential part of Austin’s method and she describes it as the first step in reconnecting to the body-self. Deep breathing is facilitated through sounding. Breath is considered a life force that connects the mind, body and spirit (Austin 2001, 2002).

On a cognitive level Austin makes her clients use their imagination whenever it can support the facilitation of the exercise proposed. In connection with breathing Austin might suggest that the client imagines breathing in something he/she needs and exhaling something he/she does not need or wishes to let go of, or by asking the client to breathe into the pain and try to stay connected to the body while doing so (Austin 2004).

Austin understands vocal improvisation in a very broad sense. She considers the entire music therapy session an improvisation; a creative process for both the client and the music therapist.

Austin understands vocal improvisation in three complementary ways:

“As a creative experience in the here and now, as a bridge to the unconscious so that repressed or dissociated psychic contents can come to consciousness through playing with sounds and words, and as a symbolic language.”

(Austin 2008, pp 136)

Different techniques are applied, and according to Austin the following are some of the basic techniques in Vocal Psychotherapy.

2.5.1.1 Application of vocal techniques in general and private practice.

Austin has contributed to the music therapy literature with several articles as well as a dissertation focusing on the voice in clinical
Breathing is, as just mentioned, the first step, and in the exhalation sounding can be addressed by starting with a technique of *toning* in allowing natural sounds like a sigh, groan, moan or any sound present, or simply single tones to emerge as a prolonging of the breathing (Austin 2004, 2008). Techniques like *chanting*, which is defined as the use of a simple melody of one or two pitches with no rhythm at all, or more complex musical structures that include rhythmic speaking, singing words or sounds, are also basic techniques to support a confidence in allowing sounding to grow.

Austin is especially known for her method of *Vocal holding techniques* and *Free associative singing*. Music therapy practised by Austin is psychodynamically oriented. She bases her therapy on the theories of C.G. Jung. She often uses the client’s dreams or “archetypes”, understood as a symbolic concept, in approaching the vocal improvisation. She also often speaks of the *Self*, which according to Austin refers to the central archetype or archetype of wholeness. She describes the Self as the ordering and unifying centre of the total psyche, conscious as well as unconscious.

2.5.1.2 Voice in therapy
According to Austin singing together can bring about physical, emotional, psychological and spiritual connections between the client and the therapist, and between the client and his or her core self. She elaborates that singing and being physically based enables a severely dissociated client to re-enter her body, to access and give voice to what was previously inexpressible. Through free associative singing, the music allows the words to become embodied and linked to feelings, so that clients can more easily heal splits between thinking, feeling and sensation. Austin describes that:

“Needs and feelings remain unmet and the voice becomes inaudible, tight and tense, breathy and undefined, or simply untrue, perhaps lovely to listen to but not connected to the core of the person. In essence, the traumatized person often survives by forfeiting her own voice.” (Austin 2002, pp 234)

The therapeutic process of recovering one’s true voice involves reinhabiting the body. True voice understood as a voice which is physically, emotionally and psychologically embodied.

2.5.1.3 Austin’s Vocal holding techniques
Vocal holding techniques form a method of vocal improvisation which creates a containing environment by sustaining chords that support melodies and/or keep a rhythm going. In order to create a safe therapeutic space, which the client can enter and interact with the music therapist Austin often begins the vocal work by breathing together with the client several times. This helps the client (and the therapist) to release excess anxiety, get grounded in his/her body and begin the process of vocal attunement. It also serves as a transition state between speaking and singing. The holding techniques include different elements such as singing in unison, harmonising, mirroring and grounding.

Austin reports that *singing in unison* can promote the emergence of a symbiosis-like transference and countertransference and internalise a stable sense of the self. The next phase is *harmonising*, which creates an opportunity to experience a sense of being separate yet in relationship with the therapist. *Mirroring* is employed to support the client in finding his or her own voice and/or integrate new discoveries of the personality emerging through the vocalisation. By mirroring Austin means recreating important melodic phrases or motifs, chord progressions and/or rhythmic patterns.

*Grounding* is, according to this approach, when the therapist sings the tone or root of the chords and in that way provides a base for the client’s vocal improvisation. Austin reports that this method supports a connection to the self and the other and promotes a therapeutic regression in which unconscious feelings, sensations, memories and associations can be accessed, processed and integrated. As a result of the two chords and of the way the therapist vocalises according to
the different elements mentioned before a predictable, secure musical and psychological containing are established.

When singing in unison with the client Austin is “listening” for the client’s needs and what feels comfortable or too merged. Austin accomplishes this by attuning herself to the clients’ breathing rhythm, the phrasing, dynamics and vocal quality. In doing so she also examines how close or distant the client is in the relationship to the music therapist.

In the entire improvisation Austin is also very much aware of the grounding effect it has to sing the tone or root of the chords, which provides a base for the client to allow her / his improvisation spring out from and then expand for coming back home again.

2.5.1.4 Free associative singing
Austin uses the term Free associative singing to describe a technique that can be implemented when words enter the vocal holding process. In its most simple form, free associative singing involves the client singing a word or phrase with the therapist mirroring (repeating) the words and the melody back to the client.

In the process of Free associative singing Austin is attempting to match the client’s vocal quality, timbre, dynamics, tempo and phrasing. In doing so the therapeutic process will be propelled forward, and the improvisational dyad will grow into more complex transference and countertransference.

2.5.1.5 “Layers of listening”

“Listening is fundamental and unique to our work. We are trained to listen. We depend upon our abilities to listen to music and words with our whole selves and this ability is an essential aspect of being an effective vocal psychotherapist.”

(Austin 2008, pp 33)

This is Austin’s opinion on listening, and in her book “The Theory and Practice of Vocal Psychotherapy. Songs of the Self” (2008) she describes her approach to listening as Layers of listening.

According to Austin listening should be understood broadly. “Layers of listening” is about listening with the whole self - body, mind and spirit. It is about tuning in, not only with the ears, but also with our bodies, minds, feelings and intuition. The listening process is broad in its understanding, and is among other things includes focusing on how the client talks, moves, makes music (sing) or is silent. It is about listening to what the clients say, and what they do not say. It is both about verbal and non-verbal content, and about listening to the thoughts, images, associations, feelings, hunches and physical sensations we have while being with and observing the client. Austin describes it this way:

“I listen to my thoughts, I listen to my feelings in response to the material as well as to feelings evoked by the clients and their music (counter-transference), I listen to my body and my physical sensations and I listen to my reactions that emerge in the form of imagery and intuitive hunches.”

(Austin 2008, pp 119)

The listening process is according to Austin circular and ongoing, and continually deepening with each round. According to Austin listening is not something which always comes naturally. Some therapists have to work hard to develop this skill. (Austin 2008)

However, Austin has not described a structured approach to her way of listening, which has been standardised and systematically applied. Still I find Austin describing the client’s voice quality very often, and therefore the following section will present my distilled understanding of the different parameters Austin listens for when she describes her clinical situations and approaches in her articles (1991, 1998, 1999, 2002) and her book (2008).

Even when sessions are entirely verbal Austin listens to the speaking voice like it was music, and explains that a substantial amount is revealed about the client’s emotional and psychological state through the speaking voice’s musical elements of rhythm, melody, timbre, dynamics, tempo, and phrasing, as well as the client’s breathing patterns, silence and...
body language. She also listens to the vocal range, and compares the vocal range of the speaking voice with the singing voice. These parameters are also applied to the singing voice of the client. In connection with the singing voice Austin also describes a listening for force and energy, which makes me consider measurable parameters like “volume” and “intensity”. Austin also mentions speed in connection with the speaking voice, and a constricted breathing, which makes me consider parameters like “tempo” and “breathing duration”. In describing a client’s voice as breathy a parameter like “compression” may be considered.

At a certain point Austin describes how she experiences that few people actually hear their own voices, because fear, blocked grief and rage keeps the voice in the throat. This suggests how a voice may be placed in the body according to how it resonates and the nature of the sound quality. Austin also mentions resonance, but it is my experience that she here speaks of both a body resonance and an actual vibration of a tone. When speaking about resonance Austin’s focus is primarily on the effect of singing and how we by singing make our bodies resonate and vibrate in order to nurture and massage the body from the inside, as well as to break up and release blockages of energy, release emotions and allow a natural flow of vitality to return to the body.

In Austin’s articles I notice that she also listens for which vowels or consonants the client uses in their vocal improvisations.

Austin does neither in her articles nor in her book have specific focus on describing vocal parameters, or in describing the voice itself in order to provide information about a client’s psychological state. When she actually does describe different vocal parameters and qualities of the human voice, it is with the intention of describing different vocal techniques providing an emotional connection to self and others or supporting the experience and sensation become conscious to the client and then verbalised.

2.5.2 Di Franco and “The Voice of the Emotions”

Gianluigi di Franco was an Italian music therapist (1993, 1999, 2001) who wrote only a few articles about his working method in English, and published a book in Italian about his working method, “Le voci dell’emozione. Verso una pragmatica della musica come terapia”.

Di Franco was known for his vocal approach. To him vocalisation and singing in music therapy was a way of giving expression to authentic emotions, feelings and Self-experience. As he also said:

“… sound does not offer us any possibility of cheating. When a man finds his own sound inside himself, he cannot but tell it to the world, without ever getting tired of it. This sound is like the cry of joy when you feel very well; it is like the cry of sorrow when you feel very bad; it is like the cry you let out that day, that year when you were born.”

(di Franco 1993, p. 90)

In this sentence one can sense di Franco’s intensive listening to the sound of a human being’s voice and his great passion for voicework as an instrument available in music therapy. He described and used vocal approach to autistic children in music therapy. Di Franco described himself as psychodynamic and psychoanalytical in his orientation, and holistic in his approach. Through his vocal approach he addressed the autistic behaviour and the emotional aspects which occur inside of the client/therapist relationship. Through his many years of clinical practice with autistic children he developed the Sound-musical profiles, which is an assessment containing:

- an interview with the client’s family,
- a receptive test to assess the client’s cognitive and emotional reactions to pre-recorded sound fragments,
- three active tests.

(Wigram et al. 2002)

Di Franco followed a plan of treatment based on elements derived from the assessment. In vocal improvisation with autistic children he focused on their ability to imitate the
instrumental and/or vocal fragment by varying the voices intensity, pitch, timbre and rhythm. The vocal parameter intensity is evaluated in relation to pp / p / mp / f / ff. Pitch is evaluated in relation to singing in tune, melodic fragments, and imitation of the therapist or spontaneously referring to the implications of a sound memory. Timbre is evaluated in relation to the use of different frequencies (di Franco 1999).

2.5.3 Sokolov’s “Embodied VoiceWork”
Lisa Sokolov is probably most known as a frontline New York jazz vocalist, improviser and composer, but she is also known as a voice work pioneer within music therapy. She has developed the method of Embodied VoiceWork, a vocal improvisation method, which she presently teaches at The Experimental Theater Wing at New York University, Tisch School of the Arts where she is a full professor. Sokolov has also taught her method on the faculty of The Graduate Program of Music Therapy at New York University for over a period of ten years. Unfortunately she has not described or published her method herself, but Bruscia (1987) has reviewed it in his book Improvisational models of music therapy where he names her approach Vocal Improvisation Therapy.

The reason why this secondary source is reviewed anyway, is because she still today is acknowledged for her contribution within music therapy. In addition, Bruscia has presented her work in detail and as a discipline.

Sokolov’s method includes breathing, toning, vocal improvisation, singing, body alignment, touch, verbal imagery, and psychotherapeutic techniques. Sokolov has a holistic understanding of the human voice and approaches the voice as a therapeutic instrument. Her theoretical orientations are based on the belief that humans carry within them processes of unwinding, healing and evolving that are essential for wellness. Her work takes its offspring in gestalt oriented therapy where the here-and-now experience and the ability of being in constant dialogue with all kinds of associations connected to the therapeutic work is in focus.

She has adopted Wilhelm Reich’s view on relationships between the physical body and the psyche with focus on the nature of body energy, character amours, and the storage of feelings, memories, and trauma in the musculature. In the use of symbolism and archetypal imagery, the creative Self and the personal and collective unconscious she connects herself to the theories of Carl Jung. Bruscia also describes Sokolov as oriented towards ideokinesiology, as well as Western and oriental traditions of healing, while integrating breathing techniques, toning, acupressure and body work in the therapy work.

Sokolov believes that the power of gaining wellness is in the voice work itself, achieved through giving expression to oneself through musical improvisations. This perspective reveals that Sokolov considers singing an universal language of the human spirit and regards the musical improvisation as a reflection of the Self, which elevates awareness of Self and others, integrates various levels of understanding, provides artistic and peak experiences, and facilitates communication with others.

Sokolov considers elements such as body, breath, tone, rhythm, melody, words, harmony and imagery as fostering both intrapersonal and interpersonal relationships. The body is “the sounder and the sounded”, subject and object and sounds communicate messages about the state of the Self. According to Sokolov each body part has its own function and carries its own imagery and messages (see Table 3).

As an example Sokolov understands the spine as the central support of the Self and may be understood as the ego strength, which influences the posture. About the throat Sokolov says: “The throat is the bridge between the mind and the body. It is the centre that connects the regions of feelings, personal power, physical creativity, basic needs, and support.” (Bruscia 1987, p. 357)

An important issue is that the clients have made the choice of the voice as the specific
The Solar plexus is the region of power.
The Pelvis a region of groundedness.
Breath is the life force.

To breathe is to inspire, bring in, open, and receive. Letting out breath is to expire, release, empty, and shine.

Tone is the reverberation of form and space, which resonates internally and externally. To produce a tone requires the Self to integrate all of its life forces and penetrates blockages and liberates the life forces while resonating.

The voice is regarded as the midpoint between the physical, emotional, intellectual, and spiritual Self. The voice is the intermediary between conscious control and unconscious regulation. The voice is the inner instrument of the body, a unique and powerful vantage point for working with the Self from within.

The Rhythm is produced as tones descend into the body, and become grounded in this structure. Rhythms reflect inner strength and drive.

Melody appears as a fluid and carries it various moods and emotions.

Words consist of vowels and consonants, and vowels relates to melody.

Imagery brings all of the musical elements of the Self into verbal awareness through symbols and metaphors.

(Bruscia 1987)

Table 3: Sokolov's axiom - key dynamics - elements of the musical self

instrument to work on their psychological problems. (Bruscia 1987)

2.5.3.1 Sokolov's assessment and evaluation profile.
Sokolov views assessment and evaluation as continuous processes in the vocal improvisational therapy which proceed in four steps:

1. The development of a profile of the client’s problems.
2. An anamnestic interview and observation.
3. Structured activities.
4. A free improvisation.
While interviewing Sokolov will observe and listen to the client’s voice, how it is placed in the body, shifts during certain topics, where it is held, let go, and supported, its range and flow, and so forth. These are all body - psyche - sound related data, which provide the subsequent psychological interpretations later on. The structured activities of the voice assessment are not described in detail. It is just mentioned that it contains various breathing, movement, and imagery exercises such as spine rolls (slowly dropping down the spine one vertebrae at a time while breathing into it), and explorations of vowel sounds, yawns, pitch intervals and ranges.
During the free improvisation Sokolov will focus her assessment on tone, timbre resonance, placement, integration of resonances, flexibility and authenticity of tone, rhythmic flexibility, melodic colour and dynamic range. However, the assessment is not described in detail and there is no description of how Sokolov define the different vocal parameters. It is reported that observations are conducted on the relationship between the client and different aspects of his/her vocal range, between musical and verbal information revealed, and between the form and function of body use. In this assessment procedure Sokolov may include verbal imagery, colour and drawing work, as well as Laban’s movement analysis.

Evaluation is done in terms of range, flexibility and fullness of vocal expression, body integration, and changes in musical responses and dream material. Progress is monitored through periodic log reviews, observations, and direct client feedback.

Sokolov has neither defined nor explained how she assesses these voice parameters: she does not describe her method in detail nor her structured assessment. I also miss a description of her listening perspectives though I sense she is very holistically oriented here as well. A description in detail of how she evaluates the different parameters over time was also lacking, as well as any relationship to physical and psychological perspectives. While going through her assessment proposal, and how it is documented, one is led to consider many different aspects. However, this has not been standardised nor systematically applied nationally or internationally.
2.6 A review of literature from other fields and professions
In my search in other fields and professions on vocal assessments focusing on profiles related to psychiatry and to voice work as psychotherapy it turned out to be especially important to review the work of Paul J. Moses and Paul Newham.

Moses published one book “The Voice of Neurosis” in 1954, and although it is many years ago it still today is one of those books everyone refers to when studying voice analysis and psychological interpretations. It is a most comprehensive book dealing with voice analysis with focus on the speaking voice. It directs the attention of the listener towards the vocal expression itself and focuses on the connection between psyche and soma, and the possibility of making psychological interpretations of vocal expression. However in his book Moses focuses on neurosis as a diagnosis. In-between he mentions other diagnoses such as depression and schizophrenia, and anxiety disorders. It falls outside the framework of this study to review Moses method of analysis in detail, so therefore I have focused on what is relevant when focusing on depression and anxiety, since this is the client group in focus of my study, and of the present literature review.

Paul Newham is the second author of importance within other fields and professions. Paul Newham’s books focus on psychotherapy with the human voice and movement as a method. Outside the field of music therapy his books are the most comprehensive ones focusing on voice and movement as a working method for psychotherapy.

2.7 Moses and “The Voice of Neurosis”
“The Voice of Neurosis” was written by Paul J. Moses in 1954. The book gives an overall description of the author’s understanding of vocal analysis and what to consider when approaching it. Furthermore it describes and defines in detail the vocal parameters which Moses bases his vocal analysis and interpretation of the human voice upon, together with his listening perspectives. Though this book was published in 1954 I still find it a very important book as pioneering research relevant for the development of a voice assessment tool. Nevertheless, it is important to bear in mind that at the time it was written the equipment for carrying out quantitative measurements of the human voice was sparse.

Paul J. Moses was a clinical professor in charge of the Speech and Voice Section, Division of Otolaryngology, at Stanford University School of Medicine, San Francisco in California. In his book he refers to and describes a vocal analysis he conducted in 1940 of an adolescent by solely listening to a phonograph recording of the voice. This analysis was a first attempt as part of a study conducted under the auspices of the University of California Study of Adolescents (Institute of Child Welfare). Moses compiled a description of the adolescent’s character and psychological constitution, and the conclusion was compared with the outcome of a Rorschach test (a psychological examination) done by a psychiatrist. There was an amazing correlation between the vocal analysis and the Rorschach test. (See appendix 6)

From this description as well as his book it is possible to see what vocal parameters Moses based his analysis and interpretation upon. It is furthermore fascinating to read his interpretation and analysis of the voice record, which clearly indicates that Moses had a method for doing this. Unfortunately this methodology for vocal analysis and interpretation is neither described in detail nor standardised in his book.

In the following I will give a concise description of Moses’ approach and understanding of vocal analysis and listening, as well as give an overview of his vocal parameters.

2.7.1 Moses’ approach and understanding of vocal analysis
Moses approaches the vocal analysis through the listener’s perception, and is concerned with what the voice is itself, and with how the hearer experiences the voice. In analysing the human voice it is my impression Moses is phenomenologically inspired in his approach and understanding, and finds the whole listening phenomenon essential in a scientific approach. He states:
“The whole is a firm anchor to reality. Parts have no life and no meaning without it. The parts must be isolated for the sake of analysis, but we should always remember that this is an artificial process. Without a thorough understanding of the relation of parts to the whole, which entails an understanding of the whole as well, no synthesis and no creation is possible.” (Moses 1954, pp 11)

Interestingly Moses’ approach of voice analysis is with the understanding that a voice analysis will be able to discover deterioration or improvement before it is verbalised by the client, and thus conscious to the person suffering or the staff around the patient. This is also my clinical experience, and a general opinion stated within music therapy about music. Moses describes this in the following:

“Perhaps the first important general observation one makes is that voice falls apart much sooner than speech does. This is logical as it is more directly connected with emotional processes and less subject to cortical control.” (Moses 1954, pp 103)

According to Moses the voice can be approached as a highly appropriate medium that mirror the mental physiognomy of the individual. This is because the essence is movement and all its qualities and attributes are dynamics. Today this understanding could be substantiated by among other Stern’s (2010) latest book “Forms of Vitality”. According to Moses vocal dynamics mirror psychodynamics and are able to capture different phases in a person’s life in the listening and further analysis. Moses writes:

“Voice is an indicator of different phases in a person’s life. It is free from static qualities. Vocal changes accompany the development of the individual, but in addition, voice contains archaic properties originating in the cradle of mankind. One can go as far as to say that vocal expression is a record of the history of mankind as well as a record of the individual.” (Moses 1954, pp 15)

Moses’ way of analysing is in general highly connected to the personality structure of a person and therefore also diagnostic in its orientation.

Moses further states the importance of separating the voice from the content by establishing objective, measurable units of observation. This is to prohibit subjective intuition and the analyst’s socially predetermined bias.

However it is significant that the parts are not treated in isolation, but integrated into a comprehensive picture of the whole. If the parts are not integrated into a whole picture Moses warns that it will limit the interpretation and connection to the personality, and its expression will become lost in the maze of detail.

2.7.2 Moses’ discipline of “Creative hearing”

Moses is describing and defining a way of listening, creative hearing, which is essential to the act of interpretation.

Moses differentiates creative hearing from intuition in that way that creative hearing is conscious, and may be used as an analytical tool to observe selected elements of the human voice in relation to each other and to the whole, and be verified, whereas intuition is something, which remains unconscious, subjective, and not verifiable by others. (Moses 1954)

This definition reminds me of how Tüpker (1990) defines controlled subjectivity, and how Pedersen (1997) defines disciplined subjectivity, which is a part of her theory of listening attitudes and perspectives. The listening attitude and perspectives will be described in further detail in chapter 4.8.

Another part of the creative hearing is an audiokinetic examination of the human voice, where the listener is “reading” his or her reflex muscular reactions and recognising those spontaneous and sympathetic kinaesthetic sensations, which occur in the muscular functions of the listener’s apparatus. In other words, this is a bodily oriented way of listening, which also is a part of my way of listening. This will be described in more detail in chapter 4.9.2.1. One way of approaching this is by imitating the voice in focus for the listener’s full attention and describing it.
Moses finds training in the hearing discipline very important and necessary. The ears of an examiner must be trained to perceive, to remember, to interpret. Moses states the possibility of being trained to constituent voice elements, such as pitch, intensity and duration.

2.7.3 The listening process
According to Moses it is more efficient to make an audio recording and construct the voice analysis from this, because the voice analyst will be distracted by the speakers' looks, gestures and his general behaviour. To make a voice analysis Moses suggests that the recording contain at least 15 to 20 sentences. The preference is a recorded dialogue, because then the vocal expression is spontaneous. If the speaker is reading up from a book, the speaker very often changes the vocal expression, and is then in distance to his/her personality and feelings. I have identified four steps in a voice analysis following Moses' directions. He encourages the hearer to listen several times to the recording in each step.

1. Step: The first impression - subjective spontaneous associations.
First of all the listening has to be directed towards the vocal expression itself, divorcing it from the content of the words, and focusing on how the listener experiences the voice. This would be an intuitive judgement depending on the associations developing when listening. Something I understand as a kind of open listening, a term Trondalen (2007) uses in the description of her phenomenologically inspired approach to microanalysis of improvisation in music therapy. The first step is therefore to write down the first impressions and spontaneous associations of the voice. This first step is never possible to recapture after having listened to the individual features. Moses uses the term individual features / dimensions about parameters describing the speaking voice. According to Moses the first impressions of the voice as a whole plays on the analyst's feelings and is merely a shortcut judgment based on previous experience. Moses further states:

“In intuition one leaves the mental doors open to free association and one cannot prevent like to dislike from forcing itself into consciousness.” (Moses 1954, pp 79)

2. Step: Focusing on individual features - specific parameters.
In the second step Moses focuses on individual features / dimensions of the human voice and describe their presence in the sound being analysed. The individual feature / dimensions will be described in more detail later in this section. In describing the observations according to specific features it is necessary to concentrate entirely on factual observation and leave out interpretation of any kind to the last step when all notes have been completed, that is, controlled subjectivity (Tüpkert 1990). Some features are more easily addressed than others. Speed is the easiest to address according to Moses, then volume / intensity.

The following questions can be a support to bear in mind:

Does the person speak slowly or fast?
How long are the pauses between words and between sentences?
Does the patient speak loudly or softly?
Is the general intensity changing?
Does the patient often pause for a new breath?
Which is the longer, inhalation, or exhalation?
Can either or both be heard?
Is either forced?
Is the range wide or limited?
Does the voice break or is it even?
Does the speaker use many dynamic accents?
Does he emphasise much or little?
Is accentuation in accord with meaning?
Does the speaker lower the pitch at the end of sentences or does he raise his voice even when he does not ask a question?
Melodic and rhythmic aspects are more difficult to follow than these simpler elements but after a certain number of repetitions, they to become disentangled.

(Moses 1954, pp 77)

3. Step: Studying the individual features and their relationship - a comparative look
The individual features and their relationships will be looked into in step three. In studying the relationship one feature will
appear dominant. A dominant is the specific individual feature in the voice which impresses immediately. The dominant feature is something, which characterises the speaking sound and differentiates it from other sounds in e.g. tempo. According to Moses the first association or spontaneous association of a sound is based most often on this dominant feature.

After having pointed out the first dominant, the second dominant is pointed out. The second dominant might not cause so much attention, but is nevertheless noticeable.

All the defined individual features / dimensions of the voice, and their relationships will be observed, studied and described.

In the flow of the speaking and in the study of the individual features Moses mentions the importance of being aware of their regularity, uniformity or their opposites in the appearance.

4. Step: The interpretation is carried out

The fourth step, the methodology of interpretation only appears as indications in the book. It seems to me that when Moses has become aware of the dominant, and has defined and described the relationship between the individual features in a phenomenological descriptive way, he starts to interpret. An example: “… a fast speaking voice with marked dynamic accents indicates positive traits: forcefulness, enthusiasm, quick perception.” (Moses 1954, pp 78)

However, Moses does warn against making stereotyped standards in the interpretation like: - a piping little voice is associated with children, - a hesitation in speech with shyness and so on.

Furthermore he states that it is important to avoid that a socio-cultural bias dominates the interpretations. A socio-cultural bias is defined as an interpretation based on the socio-cultural aspects of the interpreter without considering and taking into account the socio-cultural differences of the client and the therapist.

Moses moreover describes how the experience in studying data, and comparing them with objectively acquired results, as well as with the subsequent first reactions tempered, contributes to one’s learning about personal equation; the personal bias for which one must make allowances.

Moses writes:

“… the urge to “score” mathematically without giving allowance to individual, racial, environmental, and cultural implications, has often blocked the road to vocal analysis for the psychologist.”

(Moses 1954. pp 80)

2.7.4 An overview and a concise description of Moses’ individual features and dimensions for vocal analysis

In the following I will focus on the individual features / dimensions of the speaking human voice defined by Moses, and present an overview and a concise description of these for vocal analysis. Where it is possible Moses’ directives for interpretation will be presented.

Moses divides the dimensions up in three categories, Acoustic Dimensions, Other Dimensions, and Other Significant Features (see Table 4)

2.7.4.1 Acoustic Dimensions of the Voice.

Moses defines acoustic dimensions as something which for the most part is measurable. They are different in nature, in signifi-

<table>
<thead>
<tr>
<th>Acoustic Dimensions</th>
<th>Other Dimensions</th>
<th>Other Significant Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiration</td>
<td>Melody</td>
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<td>Range</td>
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<tr>
<td>Resonance</td>
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<td>Rhythm</td>
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</tr>
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Table 4: Moses’ individual features / dimensions of the speaking voice. (reproduced from Moses 1954, pp 31)
cance and in effect, and a trained listener will be able to clearly identify and isolate them. (Moses 1954)

Respiration:
Moses describes how sounds are produced by currents, jets, puffs, explosions and stoppages of breath, and how respiration starts automatically with the intention to speak, whereas respiration is conscious and willed in singing. Normally the respiration will be balanced according to the intention of the vocal production, and progresses fluently. However, according to Moses the respiration is extremely sensitive and will be effected involuntarily by activities, emotions and urges. The respiration can become rapid, irregular, intensified in irritability. The same reflexive affection of the respiration occurs with the recollection of emotions. When describing the manner of breathing Moses listens for the irregularities and has listed following elements and co-ordinations for analysing the respiration in terms of expression:

1. Depth and volume of breathing
2. Frequency of respiration
3. Relation of expiration and inspiration
4. Relation of thoracic versus abdominal functions
5. Relation between the amount of air used and the intended tone
6. Rhythm of respiration
(Moses 1954, p. 33)

- Directives for interpretation
According to Moses a well balanced respiration is exhibited by an integrated personality and a person balanced in the immediate situation of his or her action. A balanced breathing is completely automatic and typical of a relaxed bodily and psychological state.

The depth and volume of breathing become shallow in a feeling of hopelessness and fatigue according to Moses, whereas the breath will be held back in expectation, and deep in release. Furthermore Moses describes how the frequency of respiration may decrease in grief, whereas there will be a need for more frequent respiration when feeling fear or anxiety.

A lack of balance between exhalation and inhalation may symbolise a variety of emotional meanings, where increased inhalation may express pleasure, and increased exhalation displeasure. Facing a difficult situation is analogous to facing a distinctly unpleasant one. In this instance speech becomes unbalanced, with quick, audible inhalations and long, forced exhalation, even at times, sighs. Forced exhalation also can denote aggression.

In studying the relation of thoracic versus abdominal functions Moses notes that the diaphragm reacts with sensitivity to emotional moods. We sigh with joy, suck in our breath when surprised, sigh with fatigue, and so on. In turn its movements alter sounds. Embarrassment upsets the coordination between abdominal muscles, diaphragm, lungs and vocal cords, and as a result an unsteady tone is produced, which denotes uncertainty.

According to Moses there is a proportion between “the tone intended and the tone produced”. The amount of air exhaled will often be larger than the sound produced when feeling anxiety, and therefore the sound produced becomes breathy. Fatigue, hopelessness and inhibitions often also reveal this symptom.

Rhythm was the means by which the magician in ancient cultures achieved the concentration necessary for the ritual. It was used to exorcise, for direct or remote control, and as a technique of self-hypnosis.

In the following two parameters Moses is unclear in his definition, both in his understanding and definition of the two.

Range:
Moses proposes that every human being has three ranges: the potential, the singing, and the speaking range. The potential range include all the tones from the highest tone a person can emit to the lowest, regardless of the nature or quality of the tone. The singing range includes all the notes from the highest to the lowest that possess a balanced quality (usually two octaves).
The speaking range Moses proposes as the deepest third of the potential range and is only a partial function. Furthermore Moses describes that women speak about an octave higher than men.

According to Moses the vocal range is the language of emotions. Primary sounds employ the complete range of the voice freely since it is connected to expressing feelings and reactions of the present situation. However, Moses points out that the human beings use of range is highly influenced by culture. Some have narrower ranges whereas some cultures permit more latitude than others. Therefore the vocal range must be seen and understood in relation to the common standards within the culture. If the range then is relatively narrower it will always indicate inhibitions, according to Moses.

Besides that it is a bit confusing what Moses is listening for relative to the vocal range. At this point it is important to remember that he has focus on the speaking voice. However Moses points out that emotions carry within them the reflex of action of shrinking or expanding, and the vocal intensity follows this pattern, understood in this way that when the vocal range shrinks so does the volume of the sound.

Register:
Register refers to a physical acoustic event. Moses proposes three different registers, which are audible in that way that when an untrained singer sings from the highest tone possible down to the lowest, the untrained singer will pass two switching points where the character of the voice change. The highest register is the head-register (falsetto), the lowest the chest-register (full-register), and then there is one in the middle, which consists of a mixture of both the head- and the chest-register called mixed register. When addressing register as a parameter Moses listens for where the vocalisation is placed in use, because both the singer and the speaker may speak with either more head or more chest function. Reading Moses’ text I understand this as a bodily oriented way of listening which in turn determines the voice quality.

- Direction for interpretation
Moses suggests that balanced use of registers expresses a balanced personality with regard to a successful identification. However, I find that some of Moses’ directions for interpretations of a person’s register are highly reflective of the period in time when he wrote the book “The Voice of Neurosis”. In that period the understanding of the psychiatric diagnosis neurosis was influenced by Freud’s ideas of neurosis. Moses describes how a twenty-five-year-old patient spoke in a high, childlike voice, which caused the patient great embarrassment. Moses examined the patient physically, and observed that the patient could easily produce a healthy baritone, but persisted in speaking in falsetto. Moses’ interpretation of this observation was that the patient’s persistence in speaking in falsetto could be traced to holding on to his mother’s apron strings. Today this would not be an appropriate interpretation, and it is my clinical experience that the psychological interpretation of an observation should be carefully addressed. I do not think there are fixed facts for certain observations of a vocal expression. It is further my clinical experience that the clients most often in time will find the reason or answer themselves.

Resonance:
Resonators for the voice are in the chest, the pharynx, the mouth and the naso-pharynx, the nose, the nasal sinuses and in Morgagni’s ventricles. The resonators make the voice audible. Low tones receive their resonance low in the chest, and high tones find their resonator in a high spot in mouth, nose or naso-pharynx.

In connection with resonance Moses only states that the resonance of the voice changes according to moods and feelings, but he does not point out how different emotional states affect the resonance. Relative to resonance Moses gives no direction in how to listen for or measure resonance.

Rhythm:
According to Moses rhythm is one of the most sensitive dimensions, because its changes are audible and measurable under
different emotions, with each individual having his own individual rhythm. Moses defines rhythm as periodic movements between tension and release.

“The individual rhythmic pattern is modified by external and internal influences, not the least of which is volition.”
(Moses 1954, p. 53)

As soon as the volition and vigilance relax, the primary rhythm of the individual breaks through the superstructure.

Moses explains how the rhythms constantly change following the change in environment as well as within the human being. This definition he compares with the waves of the ocean which are similar but never the same, and thus a dynamic / living thing, which cannot be quantitatively exact. Total regular rhythm lacks life. Rhythm is however an essential element of human physiology and psychology. Moses writes that:

“Rhythm of speech, our common vocal expression, must in some way reflect both our personality and our pathology.”
(Moses 1954, p. 52)

Moses contends that vocal dynamics express psychodynamics, and therefore sees that normal rhythm is the composite of:

- The individual’s biological rhythm pattern
- The rhythm of the language which serves as a medium and which had to be learned
- The understanding of the meaning inherent in the utterance.
(Moses 1954, pp 54)

It is still worth remembering that Moses focuses on the speaking voice, and thus the present parameter is of special importance. Rhythm is considered the physiognomy of speech, modified by elements which express the momentary affect situation. Moses then further gives several examples on how the rhythm has marked influence on how we perceive and in between are seduced by the speaker. Hitler did it with his hyper-rhythmic voice and President F.D. and Roosevelt, whose voice had a swinging melody and an “easy” rhythm, employed it to assimilate what he had to say.

- Direction for interpretation
According to Moses panic will remove the inhibitory factors, and the speech will then, like movements resemble “rush and rescue, and hurry away”, while enthusiasm may exaggerate into a hyper-rhythmic collage of cheers.

2.7.4.2 Other Dimensions

Melody
The melody carries the marks of the speaker’s moods and attitudes, and therefore also the intent (not the content) communicated. According to Moses a voice without melody is meaningless, and even an involuntary cry of pain has a melody. Further, Moses (1954) describes how the sentence in any language “is a sequence of pitches resulting in an organised musical structure. The voice rests only occasionally on one note. It glides continuously from one tone to another, up and down, around a basic pitch.” (Moses 1954, pp 60)

According to Moses any melody, in speaking and in singing, can be isolated from other vocal elements. It can be scored, measured and reproduced. However Moses does not clarify how this is done, but I sense it is about studying the form and structure of the melody, but with attention to pitch, intensity and socio-cultural influence. Every language and every dialect sings in its own way.

- Direction for interpretation
The greatest variability in melody is found in its intervals, and here wide intervals characterise excitement according to Moses. All manic emotions are channeled through comparatively large intervals. A voice that uses large intervals freely and frequently is expressive of emotions, genuine or simulated, which in other words means that the person is rich in feelings, or that he has the power of representation, or both. On the negative side, large intervals may mean pomposity, exaggeration, or lack of emotional balance.

Moses describes how one in a sad and depressed voice often hears a tendency to
lower the pitch. Each impulse to lower is accompanied by decrease in intensity. It is as if the strain of maintaining a higher pitch is too much for the patient. A declining melody, particularly if it is repeated regularly, connotes depression. If the melody of depression however is constant in a voice, the person reveals a pathological symptom.

Moses’ understanding of melody is about studying the form and structure, and even considering any melody, in speaking and in singing, possible to be isolated from other vocal elements. Therefore it is interesting that Moses has not referred to and used Susanne Langer in his interpretation of the melody. In 1942 Langer published her philosophy about how “music articulates forms which language cannot set forth” (Langer, 1956, pp 189). She defined art as “the creation of forms symbolic of human feeling” (1953, pp 40), and further asserted that the tonal structures of music have very close resemblance to the forms of feeling, “forms of growth and of attenuation, flowing and stowing, conflict and resolution, speed, arrest, terrific excitement, calm, or subtle activation and dreamy lapses” (Langer 1979, pp 27). Langer further (1956) stated that since “the forms of human feeling are much more congruent with musical form than with the forms of language, music can reveal the nature of feelings with a detail and truth that language cannot” (pp 191).

### Intensity, Emphasis, Accents

Intensity as an individual feature is organic in its structure with dynamic accents of volume and speed modifications. The intensity changes must be evaluated relatively rather than absolutely.

According to Moses intensity is a manifestation of the basic psychological energy. On the positive end of the ambivalent scale, increased loudness expresses vitality, creativeness and aggressiveness. On the negative end it can mean brutality, gross sensuality, and intemperance. The intensity changes in direct relation with the pitch. For interpretation the intensity must be subdivided into volume and stress. As an example the intensity of an entire sentence might be increased, or a single word or single syllable might be more stressed. Moses (1954) describes how Emphasis designates the increased intensity of a sentence while Accents places stress on a word or syllable (pp 63). Accents are vocal manifestations of very different psychodynamic forces. They intensify the emotional undertone but do not disclose the nature of emotion.

### Speed

One can measure not only the duration of phonation but also the length of the pauses between and determine the pattern of how they are related to each other. To compare various speeds, one compares the elements and the composite.

#### 2.7.4.3 Other Significant Features

**Pathos**

Pathos is a way of expressing something that is particularly characteristic of a person. Pathos is this “something” in the vocal expression of a truly engaged person, which makes other people say: she / he is an engaged person. According to Moses pathos is this “something” which bridges the identification between how you experience your Self, and how other people experience your Self. It is this “something” which defines the person and the person herself / himself believes and trusts she/he is. An example could be authority. Some persons may have integrated the pathos of being an authority in both the self-experience and in the experience others get from being with this person, whereas if a person doubts herself or himself this integration is not present, and this will effect the pathos in the voice.

Moses himself finds this parameter very difficult to pin down to vocal details that create the resulting impression of pathos. He points out that there is no norm to pathos. It is variable and significantly affected by among other things a person’s age, life and culture.
However he defines pathos as:

“The intervals and their movements from low to high, or high to low, are the emotional keyboard of our speech. Pathos, being the reflection of our emotional profile, is mirrored in the musical intervals.”
(Moses 1954, pp 70)

Because of the variability of the pathos, some pathos may not be experienced simply because you do not know the culture of the person speaking. This also indicates the risk of misunderstanding a person’s utterances.

Mannerism
Mannerism can be observed when a person uses a range which is not the true range of the speaker. This appears when a person wishes to give a certain impression, but does not have this quality integrated. This will result in a voice without pathos, but with mannerism.

Melism
Moses explains how this parameter is a hairline brush touch in a painting, the minute variation on a main musical theme. It needs a trained ear to observe, but will be something which we definitely intuitively react to. As Moses puts it:

“Melism can consist of an imperceptible ritardando or acceleration, of a minuscule pause, a slight glide in pitch, or the tiniest inflection so small as to be immeasurable.”
(Moses 1954, pp 72)

Melism is what makes the difference between a compliment and a worded compliment ironical.

Regularity, Uniformity, Exactness
Regularity is when a person repeats one or more vocal qualities at regular intervals, or in response to certain stimuli. Uniformity in stated when regular repetition appears in the entire process of phonation; when there is an element of compulsive rigidity to the phonation. Both regularity and uniformity relate to the flow of speech. Exactness in speech is a result of training and can be spotted in any random moment. It can be observed in greater respiratory pressure and better abdominal support exact pitch without too much glissando, well co-ordinated resonance and careful articulation.

Summary of Moses’ work
Although Moses focuses on the speaking voice I find his book on “The Voice of Neurosis” a very important, comprehensive and central book in the history of approaching and understanding vocal expression, assessment and analysis in relation to psychological processes. Though the book was written in 1954 it still presents a significant amount of relevant information on what to be aware of, and what vocal parameters could be focused upon.

Though Moses is highly detailed in his way of describing and defining the different parameters in focus for carrying out his voice analysis, and gives a substantial amount of clinical examples along the way, he does not describe how each parameter could be evaluated or measured. It is therefore my impression that his method is complicated and very comprehensive, and as such difficult to carry out unless you are trained and have the possibility of an ongoing supervision of your analysis and interpretations during your training. Furthermore Moses does not always describe the treatment of the psychological problems, and this makes me consider that his analytical method perhaps is intended to be used, like in his first attempt described earlier, as a possible screening test, and not necessarily also followed up by vocal therapeutic work.

Moses divides his parameters into three categories Acoustic Dimensions, Other Dimensions, and Other Significant Features. The first two categories I find more general and measurable with modern technology and software. The last category differs from the first two categories in that the parameters here are more subjective sensations and interpretations and not as objective parameters as the rest. Furthermore I find the parameters Regularity, Uniformity, and Exactness more specifically addressing the speaking voice.
2.8 Newham’s “Voice Movement Therapy”

Paul Newham (1993, 1998, 1999) is the founder of Voice Movement Therapy,™ which among other things grew out of his work with severe mentally and physically handicapped children and adults. Newham has written several books about voice-work, and he has defined ten vocal parameters of the human voice, which he finds universal to all human beings. They are labeled ingredients (see Table 5). I will describe these ten ingredients in more detail later in this section.

According to Newham the ten ingredients are more or less present in the sound of the human voice, whether singing, speaking or vocalising spontaneously. In connection with the ten ingredients Newham has worked out a system with the intention of having an analytical profile for interpreting voices, a psychotherapeutic means by which to investigate the way psychological material is communicated through specific vocal qualities. This function as a training system for developing the expressivity of voices by physiotherapeutic means, which release the voice from functional misuse. Connected to this is the training of the listening skills and the ability to make an analysis based on the vocal expression. In addition Newham introduces a notation system in his book “Therapeutic Voicework” Newham (1998), which has been developed in collaboration with Barb Jungr.

Newham has developed short courses leading to a professional Diploma in Voice Movement Therapy, which was accredited by the Oxford and Cambridge University and Royal Society of Arts Examinations Board. He founded Voice Movement Therapy,™ in 1992 as well as a foundation of the International Association for Voice Movement Therapy.

Voice Movement Therapy is defined as a way in which singing and the expressive use of the voice can facilitate psychotherapy. Sounds produced by the human voice can be shaped to form songs which reveal and express the Self. It is a way of how singing and vocal sound-making can contribute to an artistically oriented psychotherapeutic process. He points out that training is necessary and offers the possibility of developing the skills of listening and sensing the composite combination of the ten ingredients.

The approach and methodology of Voice Movement Therapy is highly influenced by Wolfsohn. The aim of Voice Movement Therapy is not necessarily to produce a beautiful voice, but to explore the complete vocal range, and to consider all sounds as authentic expressions of the person. In his teaching and work Newham observed that the main obstacles to liberate vocal expression amongst handicapped clients was neuromuscular, whereas the inhibitions and constrictions in the vocal expression primarily were psychological reasons manifested in various muscular hypertensions amongst other professional care assistants, speech therapists, psychologists and a broad range of workers in the field of special education.

Newham realised that he had to understand not only the physiological nature of vocal expression but also the relationship between voice and psyche. This in turn became the reason why he decided to pursue a theoretical study of physiology and psychotherapy, and undergo psychoanalysis himself. To understand the physiological process of vocalisation Newham arranged it so he could observe the internal workings of his larynx whilst vocalising by making a video stroboscopic recording.

[9] Alfred Wolfsohn will be introduced and described in more detail in chapter 4.

| - Loudness  |
| - Pitch    |
| - Pitch Fluctuation |
| - Register  |
| - Harmonic timbre |
| - Nasality  |
| - Free air  |
| - Attack   |
| - Disruption |
| - Articulation |

Table 5: The ten ingredients of the voice according to the Voice Movement Therapy system (Newham 1999, pp 73)
2.8.1 Newham’s ten vocal ingredients

According to Newham it is not possible to transcend our subjective judgements and gain insight into the psychology of vocal sound without studying and examining the acoustic basic and universal ingredients which create vocal sound. According to Newham that would be the ten ingredients.

Newham describes how each of the ingredients acts as an emissary for psychological and emotional material and carries within it certain psychological implications. In learning to access the ingredients it is possible to help and heal particular issues. At the same time Newham states that each ingredient has an almost infinite spectrum of potential psychological meanings. He in each case only describes the more common psychological aspects. He points out the importance of not falling into the trap of proposing that a particular vocal ingredient or combination consistently expresses a specific psychic component. However he also points out that the psychological interpretations can only be understood accurately in the context of a compassionate and empathic relationship with each individual vocalist.

Newham does not offer a specific methodology for analysing or evaluating the voice, but he does describe how each single ingredient is perceived. He also offers a developed notation system, which will be described later.

The intention/aim of the ten ingredients is to present a framework within which all voices can be analysed, and which is universal in its use. Not simply to analyse what ones hears, but also offering a training system for enabling a single human voice to acquire the dexterity with which to manifest manifold combinations of vocal qualities. When this is achieved, the voice is able to serve both artistic procedures by bringing greater vocal flexibility to the process of vocal expression and is also able to express a greater range of emotional and psychological experiences. His seminal idea is that Voice Movement Therapy will reclaim and expand lost parts of the vital personality and provide the client with a language of self-revelation within which certain emotional experiences can be contained and expressed by specific sounds. In other words it can be a key to personal development.

Newham makes it very clear that training is necessary in order to accomplish this knowledge and experience as a practitioner. The training will additionally provide the possibility for an attentive listener to sense the composite combination of the ten ingredients which may be present in a voice at any given time. In gaining knowledge about how the different ingredients are produced, it is possible to learn to access the ingredients, be trained to listen to the human voice in terms of the ingredients and thus also provide the basis for analysis and interpretation. (Newham 1999)

Newham describes the ten ingredients by first giving a physiological description, then writing the more common psychological aspects of each ingredient, and ending up giving some guidelines / a methodology of how to develop each ingredient through voice work.

Because this study is about developing a way of assessing the human voice, finding and choosing vocal parameters the following description will focus on giving a concise description of the nature of Newham’s ten ingredients and how he described these to be perceived. This will be followed by a description of the Newham and Jungr Notation System. The ten ingredients are presented in “Using Voice and Song in Therapy” (Newham 1998, 1999) with reference to the singing voice. The psychological foundations are described in more detail in “Therapeutic Voicework” (Newham 1998). The Notation System is only presented in “Therapeutic Voicework” (Newham 1998).

**Loudness:**
The human voice is perceived on a spectrum of loudness from quiet through moderate to loud.

**Pitch:**
The sound of the human voice has a certain fundamental frequency, which can be perceived to have a certain note or pitch on a spectrum from low to high.
**Pitch fluctuation:**  
The sound of the human voice can be sustained with more or less constancy. The constancy depends on the interval of the fluctuation and the speed. If the pitch interval of the fluctuation is too great and too slow, it most likely will be perceived as inconsistent or untuneful. However pitch fluctuation can be produced deliberately because of a certain singing style, and is then often referred to as a sound with *vibrato*. Pitch fluctuation is perceived as being fast or slow, great or small.

**Register:**  
Newham (1999) defines register in the following way: When singing the lowest note in the pitch range and rise one note at a time up to highest note a transition / register break will occur in the middle where the voice quality changes. The low register is named *modal* (*chest register*) and the high register is named *falsetto* (*head register*). According to Newham these terms originate from an idea within Western classical singing that the falsetto register generates more vibration in the head while the modal register resonates more in the chest, a notion which Newham claims to be misleading (Newham 1998, 1999).

However in a previous edition Newham (1998) mentions two more registers; the *whistle register* and the *fry register*, both part of his developed notation system.  
*Whistle register* is defined as very high sounds like a piercing scream, which require that the vocal folds remain closed along the majority of their length so that only a minimal portion vibrates, forming a tiny glottis.  
*Fry register* is defined as sounds like a low, airy grumble sound always produced on low notes when the vocal folds are very lax and their entire length phonates.

In the newest definition register is perceived as being either modal, falsetto or blended.

**Harmonic timbre/resonance:**  
A specific note / pitch produced by the vibration of the vocal cords can resonate with very different timbres - vocal qualities - depending on the configuration of the vocal tract. The voice tube is elastic and runs from the lips to the larynx, and can differ both in

![Figure 3: The first tube - the flute.](reproduced from Paul Newham 1999, pp 87) length and in diameter. Newham speaks of three basic tubes, which are closed at the bottom but open at the top, constructed with different diameters and different lengths. He gives them the metaphoric names *flute*, *clarinet* and *saxophone*.

In the first tube (see figure 3) the larynx is high in the neck and the tract is short and narrow as when whistling. This tube Newham names the *flute*, which may sound bright, twangy, shiny and shimmery.
In the second tube (see figure 4) the larynx is in a lower position and therefore creates a medium long and wide tract as when steaming up a pair of glasses. This tube Newham names the clarinet, which may sound more thick, solemn and fruitier.

In the third tube (see figure 5) the larynx is fully descended in the neck and therefore a fully lengthened and maximum dilated tract as when yawning. This tube Newham names the saxophone, which may sound more full, moaning, round and dark.

The work with massaging the voice tube in its shape, dimension and size Newham points out as the most important part of the physical work in connection with voice work. It enables all the other vocal ingredients to be reverberated, amplified and enhanced. He writes:
In an earlier edition Newham (1998) describes how he has decided to keep the analysis of the harmonic system simple and in the training has incorporated an attention to the voice in a way that ascertains the likely dimensions of the the two halves of the vocal tract; the shape and dimension of the mouth and oro-pharynx (the oral tube), as well as the shape and size of the pharynx and supra-glottal spaces (the sub-oral tube). Here he points out how the three basic positions can be combined in nine combinations all in all (Paul Newham 1998, pp 60)
“Expanding the tube therefore enables people to make the most of themselves, to reveal themselves in all their colours. However, dealing with all the psychological inhibitions which prevent the tube from expanding and the soul from being amplified constitutes one of the most important areas of psychological work. Expanding the tube means expanding the Self; thus it sits at the core of the healing process.”

(Newham 1999, pp 90)

Nasality - Violin:
When sounding, not all the air that carries the sound up from the larynx passes through the mouth. Some of it may pass up above the roof of the mouth and through the nasal passage, exiting through the nose. The amount of air passing through this passage can either be prevented completely or a maximum of air can pass through. If there is a high degree of air passing through the nose while sounding, the sound usually will be referred to as hypernasal. If there is a depleted nasal resonance the sound will be referred to as hyponasal. A nasal sound can appear in all three above described qualities and give the flute, clarinet and saxophone a touch of nasality. This special nasal sound Newham names the violin. It is perceived on a spectrum from none through moderate to high.

Free Air:
While sounding, the vocal cords vibrate and are momentarily pushed together many times per second. However, if the vocal cords during the moment of contact are not pushed tightly together, breath will seep through the crack, and the sound then is referred to as breathy. This Newham calls free air. The more loosely the vocal cords are pushed together, the more free air the voice will have. The quality of the voice is perceived as being more or less breathy or airy, perceived on a spectrum from none through moderate to high and determined by the volume or quantity of air flowing through the glottis.

Glottal attack:
The pressure of the air travelling up from the lungs determines the force with which the vocal cords contact each other during vibration, which further determines the loudness of the voice. Because of the neuromuscular connections the force of the vocal folds contact can be increased or decreased without making the voice louder, but giving the voice its certain stress, creating sounds with varying degrees of glottal attack. This is called glottal attack and will be perceived on a spectrum from lesser to greater.

Disruption:
The human voice may or may not be disrupted to some degree. It can either be broken or sporadically interrupted in a way which appears to interfere with the continuity of the tone. This can be caused by friction or uneven contact between the vocal folds, by other tissue structures coming into contact with the vocal cords during vibration or by intermittent silence breaking up the tone.

Vowel/Articulation:
“The human voice may be perceived as producing sounds which appear close to a sound usable within the spoken language of a particular culture and which are produced by the shapes of the vocal tract in combination with the movements of tongue and lips.”

(Newham 1999, pp 139)

2.8.2 The Newham/Jungr Voice Movement Therapy Notation System
As part of a research programme at Goldsmith’s University, London, Barb Jungr together with Newham translated the vocal components into a graphic alphabet of signs (Newham 1998). When evaluating the vocal ingredients Free air, Pitch, and Volume, there are three different positions of the sign to represent three different values of the single ingredients. In the vocal ingredients Pitch, Fluctuation, Glottal, Attack, Disruption and Violin the ingredients are evaluated according to contrast; either / or.

The timbre, the three Vocal Tract Configurations have three different graphic signs. Newham uses letters to indicate if the sound is Modal, Falsetto, Whisle or Vocal Fry, and letters indicating if the sound is in the oral part of the tube or vocal tract or in the sub-oral part of the tube or vocal tract. According to Newham this system will provide a method where it is possible in a quick and convenient way to record vocal
transformations during a session. He points out that this notation system will help you remember what happened in the session or when reporting the outcome of the therapy in a professional context. Newham also points out that this notation system will be a support for ethnomusicologists and researchers working in the field.

2.8.3 An overall critique of Newham
Having experienced the Roy Hart Theatre approach to voice-work myself for several years, as well as taken a certificate in Voice training within Centre Artistique Roy Hart, it is not difficult to follow Newham's thoughts and his ten ingredients presented here. However it is also my experience when discussing different approaches and understandings of vocal training with colleagues, that this practical experience and knowledge of the history is needed to totally understand this specific approach. I do not think I would have sensed the method and the proposed exercises if I did not have practical experience of the Roy Hart Theatre, where many of the same exercises described by Newham are undertaken. It is also therefore very clear to me that Newham's meeting with Enrique Pardo of the Roy Hart Theatre must be considered ground-breaking to him. It is very clear to me from where Newham has got his inspiration, and whose work he has taken further, namely Alfred Wolfsohn's. Newham has step by step in his research of The Human Voice, resourced Alfred Wolfsohn's literature. By taking singing lessons in different contexts Newham has recognised useful approaches, exercises and methods to facilitate authentic vocal expression. Then he has gathered it, formed and named it the Voice Movement Therapy™, written it down and published it. Newham's work is definitely an important contribution, and is done truly in the spirit of Alfred Wolfsohn's thoughts, understanding and philosophy of voice-work.

Newham also has the theatrical touch which Roy Hart integrated in the voice-work after Alfred Wolfsohn's death. In many ways Newham has verbalised what Wolfsohn and Roy Hart were not able to do in such a detailed way at that time, namely the theory and philosophy in connection to voice-work, and what I personally think students of Alfred Wolfsohn and later Roy Hart should have done years ago. Presently some of them are still alive and have an extensive experience in listening perspectives according to voice-work. There is a great deal of knowledge which hopefully will be inherited and delivered through "apprenticeship learning" (through Master Classes only). This specific knowledge of or approach to listening perspectives I do not experience Newham describing or demonstrating in his literature. It is a fact that you have to be introduced to different sounds before you are able to hear them properly and be focused in your listening. The principles of listening will be fully described and explained in chapter 4.8, since this is an essential part of the present study.

As far as I know, the “ten ingredients” described above are Newham's original work, and it is within these parameters that his Voice Movement Therapy is framed. Newham presents this as a systematic methodology for using voice and movement as means of expression in therapy. In other words they are presented as a key to self-development when they are used as a probe and as a mirror of emotions and reflections while stretching and exploring its acoustic components.

Newham gives concise descriptions of the nature of each component and his suggestions of its main psychological pertinence. Newham's selected vocal parameters are claimed to adress the human voice whether singing, speaking or vocalising spontaneously. I have not been able to find documentation or results in Newham's literature of how his method of analysis is used in practice. Moreover, I have found no academic or scientific reports and no well documented description of his research and findings.

The only time I get a sense of some documentation is when he uses a laryncscopi to get precise information about voice-production, yet there is no description of how he used this information, what it revealed, and how it gave him specific information from which he was able to draw conclusions. It is not represented in a format appropriate for documentation / illustration of the sound-production of a
Still I find that Newham has contributed an important piece of work in describing the principles and practice for Voice Movement Therapy. In the same way as Moses Newham’s books, academic or not, are important to include when addressing possible vocal parameters when listening to the human voice and analysing it, and addressing the topic therapy related body and voicework.

2.8.4 Critique of the Newham & Jungr Notation System

I do not find the notation system usable without training and without having learned the graphic alphabet of signs by heart. Taking a closer look at for example the parameter “Free Air” (See figure 6) I find that this could be illustrated/notated more easily on a Likert-scale instead of using three different signs, which you then have to remember.

When considering Newham’s statement about the usefulness of the Newham/Jungr notation system in reporting the outcome of the therapy to an interdisciplinary team, I do not find this notation system neither clear nor easy to adapt for the interdisciplinary team. It cannot speak for itself. The signs do not give clear associations to the quality of the voice to people who do not have a training within this specific field and methodology of notation, which Newham & Jungr offer. It needs a trained person to translate the signs, and I find that the invented signs make the distance between the voice specialist and the untrained colleagues unnecessarily large when inventing a language so extremely different from other disciplines you have to collaborate with. This does not support or facilitate the understanding of what happens within a sample music therapy session.
Summary of the literature review

As a summary of the literature review, table 6 (Summing up Vocal Parameters, see table 6) identifies and extracts potential and relevant vocal parameters. The title of a parameter may vary according to author, field and profession. In the table I have focused on meaning and attention for a given parameter, and given less attention to the exact names/titles of the different parameters. For example, Moses pays attention towards respiration and describes how he focuses his attention towards duration of inspiration and expiration.

This I compare and understand as similar to paying attention to breathing and duration of breathing and sounding. Another example is the use of the word intensity, volume, or dynamics of human beings’ sounding. In the literature I experience that these words are used with the intention of describing the same phenomenon. Therefore I understand this as paying attention to similar areas of the vocal expression.

Furthermore I have divided the table into categories for studying and analysing the category/parameter from different perspectives, e.g. pitch and quality or colour of the voice.

Within the field of music therapy most parameters have been extracted from Bruscia, Austin, and Sokolov. Both Austin and Sokolov are voice pioneers within music therapy. However, it is within other fields and professions that most of the parameters have been identified and extracted, and where quantitative methods for analysis are proposed.

Of all the parameters identified the fundamental frequency is the parameter studied and analysed the most within research on speech and affective disorders. Importantly it is also concluded that it is necessary for researchers to reach beyond single measures of the most common voice cues. Especially within research on speech and communication of emotions the fundamental frequency is studied more closely in various ways, by looking into fundamental frequency variability, fundamental mean floor, pitch control, fluctuation, accuracy, intonation and contour, as well as defining the register for sounding the fundamental frequency.

The importance of the parameters pitch (fundamental frequency) and pitch range is acknowledged across disciplines and professions, and they are also the parameters given most attention within music therapy.

The quality or timbre of a tone is another important parameter addressed across disciplines. However, within the field of music therapy quality is addressed in a more qualitative way by looking into the parameters resonance, vowel, consonants and melodic colours. Within music therapy resonance in this context is defined as a sound more or less resonating, whereas the study of the formant structure and spectrum in psychoacoustics leads to more specific perspectives of a vowel sounded on one single tone, and moreover offers a quantitative way of studying the quality or resonance of a tone.

In the study of dynamics the interest is primarily focused on intensity and tempo. The parameter tempo is addressed in connection with improvisation and while speaking.

The attention towards breathing and duration is mainly shared by studies within speech, except for Austin, who also draws attention towards the breathing phenomenon and the breathing pattern as an important parameter. However breathing and duration are two parameters which I from the literature review have discovered might be very central and valuable parameters to measure or describe, because they are so closely related to emotions.

Finally there is a large category of parameters named other. Within this category musical parameters like melody and rhythm are given more attention. This attention is shared among music therapists and Moses. In the field of music therapy the parameters are addressed in connection with free improvisation, while Moses addresses it while listening to a client speaking and telling about himself. The parameter body placement is only mentioned in passing, and only within music therapy. In two cases out of three it is a parameter extracted from the working
methods of the two main voice pioneers within music therapy, Austin and Sokolov. The same is almost the case with the parameter flexibility. This does not necessarily mean, that body placement is less important, but rather that it is very difficult to define and evaluate.

The remainder of the identified parameters in this category is specifically related to a field or profession, as well as focus and interest.

The literature review in general has revealed a significant lack of attention towards the human voice within music therapy as a possible source for information about affects and emotional states of a client. Furthermore it has revealed the importance of looking into other fields and professions when identifying relevant parameters and also quantitative ways of studying the human sound within music therapy. Indirectly, this draws the attention towards how music therapy needs to include elements from other fields. In doing so I find it important to be overtly conscious about how to balance these different aspects within music therapy. The action should address working approach and interpretation, and how to communicate this to colleagues.

Tony Wigram drew the attention towards the analysis of music as a natural starting point when formulating criteria for systematic assessment. I agree with Wigram on this point, especially when the purpose is to provide a more reliable and substantive body of evidence in the required interface between a humanistic approach and a natural sciences approach.

The result of this literature review influences the design and methodology of this study in different ways. This will be clarified in the following chapter. Therefore relevant vocal parameters extracted for constructing the voice assessment profile within music therapy will be summarised will be summarised in chapter 7.
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<th>Vocal parameters</th>
<th>Alvin</th>
<th>Bruscia</th>
<th>Grant</th>
<th>Austin</th>
<th>Franco</th>
<th>Sokolov</th>
<th>Baker</th>
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<th>Moses</th>
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Table 6: The vocal parameters deduced from the literature review
We do not operate in isolation. The results of our studies cause us to reflect deeply on our practice.

Carolyn Kenny 1998
3. Design and structure of the study
- an overview

There is no simple or singular way to answer the research questions of this study, and thus the design of the study and the development of a voice assessment profile are multi-layered and complex. When determining the methodology I therefore will establish a clear focus for the research before deciding on appropriate research methods (Wigram et al. 2002, pp 225).

In order to answer the research questions this study will employ mixed methods (or multiple methods1) including both qualitative and quantitative research methods, and including both fixed and flexible designs (Robson 2002, Creswell and Clark 2011). The term multiple methods or mixed methods is often used to cover the same phenomenon. In this dissertation I will use the term mixed methods, and this will be discussed later in chapter 3.4.

Throughout the dissertation a Chinese box of different designs and methodologies will be presented and described in detail alongside the process of the study. Results will accordingly be presented in the style of the chosen methodology. Throughout the study the client and the clinical practice in music therapy are taken into account and serve as a red thread in the presentation of methods, data and results. In a way the clinical relevance of this study is directing the methods employed. For example, a multiple case study is part of evaluating the VOIAS performed to evaluate a voice assessment profile.

3.1 Reflections on epistemological issues

Robson (2002, 2011) advocates the use of mixed methods, expressing that the use of more than one method can have substantial advantages, even though it almost inevitably adds to the time investment required. The epistemological advantages may be: a) a reduction of inappropriate certainty (“clear-cut” results may not be “right”), b) multiple methods permit triangulation (of sources, methods, investigators, or theories), c) they may be used to address different but complementary research questions within one study, d) they may enhance the interpretability of the results. (Robson 2002, pp 370 - 371).

The research questions of this study raise issues which cannot be addressed by applying purely well-defined qualitative or quantitative methods. Furthermore, the study as a whole needs a flexible design since it is dealing with processes on different levels, which will be clear as the study unfolds. Therefore the present study will attempt to follow Robson’s guidelines and benefit from some of the suggested advantages.

As a researcher I place myself with one leg in humanistic science and one leg in natural science. Music therapy research embraces

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1) Robson (2011) now suggests the concept multiple methods be exchanged with multiple strategies (Robson 2011).
both traditions (paradigms) as well as social science, and ways of combining these different disciplines. Additionally (as mentioned in chapter 1) I also find a need for bridging the two in our profession and making this position clear to our colleagues in an interdisciplinary team. As a clinician working in psychiatry and being part of an interdisciplinary team I represent a humanistic approach and understanding most of the time. However, when it comes to my own approach and working method of the human voice I represent both. In my opinion, voice work is a very concrete physical experience, affecting the body as well as an inner psychological experiences and processes.

Both the psychological and physiological state of the client is communicated when vocalising. Therefore I do not find the use of both qualitative and quantitative methods self-contradictory. On the contrary I find it necessary when developing a voice assessment profile, which can 1) document my work according to the principles of evidence-based practice (Wigram 2002), 2) form a profile providing information relevant both for music therapy and for the interdisciplinary team about the client’s state and the ongoing treatment.

3.2 Reflections on the ontological issues
Bonde (2005) states that the choice of methodology will always include epistemological, axiological and ontological dilemmas (Bonde 2005, pp 128). The research paradigm and personal preferences of the researcher play an important role in all research (Robson 2002, Bonde 2005). According to Bonde (2005) the validity of the music therapy research study is enhanced by precise information on which interventions was used how, when and in what context (Bonde 2005).

Furthermore it has become clear to me during several presentations of this study that differences in the listener’s (music therapist’s) vocal training, approach and employment of vocal exercises in music therapy have a crucial effect on how the outcome of the work is understood as influencing a client’s state of being. As such, it is of great importance that I clarify my ideas of and approaches to the human voice, the human being, psychiatric problems, and the nature of reality explicitly in order to inform the reader. Since the client and the clinical practice are closely connected to every step I take throughout the study my clinical approach is a part of the research method, and will be described in detail in chapter 4. Furthermore this chapter together with parts of the literature review will also establish a foundation for the psychological interpretations proposed in connection with the quantitative analysis in chapter 8.

3.3 Reflections on multiple case studies
I will explain the validation or relevance of using a case study research design by focusing on this quotation from Robson’s book “Real world research”:

“Case study is a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence.” (Robert Yin in Robson 2002, pp 178)

In a case study, the patient / case is the phenomenon of primary interest, and in this research project the case study utilizes an approach of developing a method to observe and collect data and examine the possible evaluation of the human voice as the particular phenomenon in clinical practice.

Since the VOIAS is something intended to be useful in clinical practice, it is highly relevant for the empirical basis of the research project, to be able to observe how it functions. By using a multiple case study design some consideration can be given to what may be generalized from a number of cases within the same clinical population as a consequence of evaluation over time. When focusing on depressive patients in psychiatry it is also the case study design that enables the reader to observe eventual tendencies in this group according to the phenomenon in its context - the human voice and depression.

According to Robson, the use of a multiple case study design in research also requires rigorous procedures. Otherwise the results will have no value as evidence. This involves
attention to matters of design, procedure of
data collection, the analysis and interpreta-
tion and the final report (Robson 2002).

3.4 Reflections on mixed methods
There is a long tradition for connecting to a
post-positivist stance when quantitative
research studies are applied, and to a con-
structivist stance when doing qualitative
research. Furthermore there is a long tradi-
tion of doing mostly quantitative research
within medicine and health service. Conse-
quently, this is a “language” which is more
easily accepted and understood. As men-
tioned earlier this study emerged from
clinical practice and the purpose of develop-
ing a tool to support the dialogue and
communication to professionals within the
interdisciplinary team in psychiatry, such as
psychiatrists, psychologists, and nurses.
Therefore I concluded that a quantitative
dimension probably would possibly support
this purpose.

Mixed methods draw on many ideas and
employ “what works” using diverse approach-
es, and valuing both objective and subjective
knowledge (Creswell and Clark 2011). This
pragmatic stance appeals to me. However it is
also a stance which is criticized for not taking
into account the differences between the two
before mentioned paradigms. It is also
questioned how mixed methods can obtain
answers that make sense (Wheeler 2005).

This refers to the tradition mentioned earlier
of how the different methods have been used
and by which cultures/groups. However, I
agree with Bonde (2011, pp 2) that quantita-
tive and qualitative are not scientific para-
digms, but complementary research methods.
Combining the two different methods in the
examination of a phenomenon does not
necessarily mean abandoning a basic world-
view. As in clinical practice when an interdis-
ciplinary team reflects and discusses observa-
tions and evaluations of the same client, mixed
methods can only broaden the
understanding and view of a phenomenon
when applied.

Creswell and Clark (2011 pp 43 - 44) refer to
Tashakkori and Teddlie (2003) and argue
that the following points should be accepted
to formally link to pragmatism and mixed
methods research:

“- Both quantitative and qualitative research
methods.
- The research questions should be of primary
importance - more important than either the
method or the philosophical worldview that
underlies the method.
- The force-choice dichotomy between postposi-
tivism and constructivism should be abandoned.
- The use of metaphysical concepts such as
“truth” and “reality” should also be abandoned.
- A practical and applied research philosophy
should guide methodological choices.”
(Tashakkori and Teddlie in Creswell and
Clark 2011, pp 43- 44)

3.4.1 My basic philosophy
The criteria mentioned above have been my
guidelines throughout the dissertation when
designing and choosing the different method-
ologies. However at the same time I find it
illusory that my basic understanding does not
have any influence at all on how I carry out
the study as a whole. This basic understand-
ing will be described in chapter 4, which also
function as the theoretical foundation for my
interpretation of the outcome of a quantita-
tive analysis in chapter 8. The principle
behind this theoretical foundation can be
described by Kenny’s (1998) metaphor of the
“Tree of Knowledge”. Kenny writes:

“In this tree, philosophy is at the root of know-
ledge. Whenever we discover new things, our
discoveries are rooted and influenced by our
philosophies. Our philosophies inform our
theories, being the trunk, the maps we create to
understand phenomenon. These maps guide us
in our practice. The data which we accumulate
as the result of our research methods is the fruit
of our efforts … Ultimately, the data returns to
the earth, which in turn, nourishes the roots of
the tree of knowledge for seasons to come. … We
do not operate in isolation. The results of our
studies cause us to reflect deeply on our practice.”
(Kenny 1998, pp 214 - 215)

Accordingly I will define my basic worldview
as the knowledge that I carry with me rooted
and influenced by the philosophy I lean on.
Figure 1: An overview of the study and the mixed methods appearing throughout the study
Design and structure of the study - an overview

- Chap 1 - Introduction and motivation
- Chap 2 - Literature review
- Chap 3 - Overall - Design and methodology
  - Emergent sequential exploratory mixed methods design
- Chap 4 - Clinical approach as part of a research method
- Chap 5 - Vocal assessments
  - Phase 2 - QUAN
    - Data collection method: VOIAS-sheets from three independent music therapists
    - Analysis method: Statistics
    - Results and conclusion of the statistical analysis
- Chap 6 - Vocal exercises
  - CoreTone
  - CoreToneVolume
  - Song
  - Vocal improvisation
- Chap 7 - Mixed methods Explorative sequential design
  - Phase 2 - qual
    - Data collection method: Semistructured interviews
    - Analysis method: Phenomenological based meaning condensation
    - Results and conclusion on the follow-up interviews
- Chap 8 - Mixed methods Sequential transformative design
  - Phase 1 - QUAN
    - PRATT MIRToolbox
    - Analysis of Vocal exercises
    - Results and conclusion on the follow-up interviews
- Chap 9 - Concurrent triangulation design
- Chap 10 - Discussion and conclusion
Thus, my knowledge is rooted in a basic worldview, which is connected to theory, method, practice and data, which then again nourishes the knowledge and understanding I carry with me (Kenny 1998).

However in the following I will define and describe how this study is composed and how the mixed methods of this study are applied as a whole and in different chapters of the study.

3.4.2 How the mixing methods appear in the study

In defining and describing the design and methodology of my study I will employ the terms by Creswell and Clark (2011) and Hanson et al. (2005).

My approach to the process of designing the mixed methods study can be described as dynamic. It considers and interrelates multiple components of research designs rather than placing emphasis on selecting an appropriate design from an existing typology, because the details of the design have emerged based on my interpretation of results of each previous phase (see figure 1). It can further be described as an interactive process between interconnected components such as purpose, conceptual framework, research questions, methods and validity considerations. (Creswell and Clark 2011)

According to Creswell and Clark (2011) both explorative design and multiphase design are used in instrument / program or theory development, including development of assessment profiles. Both designs are used frequently within the health service.

As a whole I will describe the design of this study as an **Emergent sequential exploratory mixed methods design** with emphasis placed on the second, quantitative phase. In other words according to Hanson et al. (2005) an unequal priority of the qualitative and quantitative analysis.

The initial qualitative phase concerns gathering information about possible vocal parameters, and selecting and defining these in order to build a quantitative profile for evaluating the human voice - VOIAS (chapter 2 and 4).  

The second quantitative phase follows two different mixed methods designs (chapter 7 and chapter 8). In both cases the use of mixed methods arose from issues that developed during the process of conducting the research such as **potentials and limitations of VOIAS** (chapter 7), **psychological interpretation** (chapter 8) of the measurements outcome, the **trustworthiness and relevance** of the information for clinical practice as a result of the interpretation (chapter 9). Therefore a qualitative method was added in both cases because the use of only one method was found to be inadequate in that phase of the study.

The mixed method design in chapter 7 can be described as an **Explorative sequential design** with unequal priority given to the quantitative and qualitative analysis (see figure 1). This part of the research is a two-phase mixed methods design.

In phase one quantitative data was collected from three independent music therapists evaluating 87 different sound files using VOIAS, and then analysed quantitatively (statistics). This was done in order to examine the inter-rater reliability and to clarify the pattern of the music therapy treatment process over time.

This was followed up by phase two, a qualitative phase, containing an interview protocol to collect qualitative data addressing the three music therapists experience in using the designed profile and manual to evaluate its potentials and limitations. These data underwent a phenomenological based meaning condensation.

The mixed method design in chapter 8 can be described as a **sequential transformative design** with unequal priority given to the quantitative and qualitative analysis (see figure 1). This mixed methods design utilized a theoretical-based framework - a transformative worldview (chapter 4) - to make a psychological interpretation (Phase 2) of the quantitative analysis of data collected in Phase 1.

Chapter 8.7 examines the data analysis of the sound files (VOIAS-1 + VOIAS-2) from...
chapter 7 and 8 by studying the developmental patterns in the process of the music therapy treatment over time (from 1st to 2nd assessment, and from 2nd to 3rd assessment, and from the 1st to the 3rd assessment, respectively).

In chapter 9 a concurrent triangulation design was carried out. The triangulation design is a one-phase design where both quantitative and qualitative methods are implemented during the same frame and with equal weight. It involves the concurrent but separate collection and analysis of data, merging the different sets of data during interpretation of results.

3.5 Reflections on validity
In Wheelers book “Music Therapy Research - quantitative and qualitative perspectives” (2005) chapter 4 defines the principles of quantitative research. Prickett describes how important it is to make stringent efforts to design the study in such a way that validity is ensured. According to her there are three main categories of validity: content, criterion-related and construct validity. All three are of great importance.

Content validity can be defined as concerning to what extent the items on a test (i.e., dependent measures, e.g. the defined vocal parameters in this study) reflect all the facets of the area being tested (Prickett 2005). In defining the voice parameters the concern is that they actually tell something relevant about the human voice, the vocal expression and the human being vocalising.

Criterion-related validity is defined as whether the test tool, in this case with the intention of evaluating a possible change over time, actually does so (Prickett 2005). In measuring each vocal parameter the concern therefore is if the choice of using the Likert-scale system will be adequate to measure a possible and relevant change on each vocal parameter over time and whether the outcome is consistent.

Construct validity is defined as whether the dependent variable actually measures the quality of the characteristic that it is intended to measure (Prickett 2005). In this study this concerns how the whole construct of the VOIAS, the manual, the guidelines and definitions are formulated, and how the test of the VOIAS / the whole research project is carried out.

According to Prickett (2005) another aspect of validity is to consider the maintenance of both internal validity and external validity. The internal validity is related to the design and how the study is carried out. The external validity is related to what extent the result of the research study can be applied in a larger context and generalized. This study endeavors to examine and prepare the possibility of applying the VOIAS in a larger context later. The integrity of any research study depends on both these terms. (Prickett 2005)

In order to obtain external validity careful consideration must be taken regarding the focus population of the study. Additionally, it must be considered to what extent the VOIAS can be applied to other groups of diagnoses. Since this is a first step this study is focuses on depression as a diagnosis within the population of affective disorder. To do so it is important that the research study is designed to obtain a high degree of control. In the description of the overall methodology the aspects just mentioned will be taken into consideration, and described in more detail. The following is an overview of the design and structure of the study as a whole.

3.6 An overview of the design and structure of the study and of the dissertation
The working process of this study builds up the foundation to be able to answer the main research questions of the study. Finding answers to the sub-questions is a part of this process (see figure 1). An overview of the study and the mixed methods appearing throughout the study.

Chapter 2 and 4 addresses sub-question 1. It is focused on identifying and defining possible and relevant vocal parameters through a literature review (chapter 2). Then follows a presentation of my clinical approach (chapter 4) focusing on the human voice and voice work in music therapy as a part of the research method. Here the ontological and
Chapter 3

The epistemological background of my working method Psychodynamic Voice Therapy is underpinned (chapter 4), and finally there is a focus on depression as a diagnosis (chapter 5). Together with the literature review this is meant to present a solid foundation for the identification of the most relevant vocal parameters as well as for the later analysis of the subjective and the objective evaluation of the parameters.

Chapter 6 focuses on the collection of data. A protocol was developed for data collection as well as for the procedure of vocal assessment.

Chapter 7 presents the first try-out of the VOIAS addressing sub-questions 2, 3 and 4 (see chapter 2). The method of this part of the study was aimed at broadening my knowledge and understanding regarding the function of the developed VOIAS in practice, as well as its potentials and limitations. Further the focus of this part was to examine the interrater / assessor agreement. In order to try out the VOIAS a protocol was developed, and a voice assessment profile VOIAS (chapter 7.1) for subjective evaluation was designed, both to be used by three professional music therapists.

The scoring of the data collected from clinical practice by the three music therapists was studied from a statistical point of view (chapter 7.3). The focus of this statistical calculation was to examine the interrater / assessor agreement, in other words the possibility of evaluating change over time (main question 2, see chapter 2). Consequently, the statistics were closely connected to the action of three independent professional music therapists solely operating in this part of the study only. Furthermore, the number of scorings was quite comprehensive since each scoring was connected to one single vocal parameter, and each vocal exercise contained many different vocal parameters.

In addition, a semi-structured follow-up interview was composed and carried out (see chapter 7.4). The interview, including the participating therapists’ reflections, underwent a phenomenological based meaning condensation (chapter 7.5).

Chapter 8 presents another quantitative part of the study, looking into different possible objective ways of evaluating the selected voice parameters in relation to the data collected from clinical practice. In order to answer main research question 2 (see chapter 2) a systematic analysis of the measurements was carried out (see chapter 8.3).

In order to answer sub-question 5 (see chapter 2) the systematic analysis was carefully related to chapter 4 with the theoretical foundation of VOIAS, in order to offer a suggestion on the psychological interpretation of the client’s process. This was performed to examine whether the analysis could provide valid and reliable results relevant for application in clinical practice. The psychological interpretation was qualitative by nature, but was placed in this part of the study, because it presents my suggestion of how the results of the measurements can be interpreted and related to clinical practice, based on my approach. A psychological interpretation was not the focus of the work conducted by the three independent professional music therapists.

Chapter 8.7 and 8.8 brings together the two quantitative measurements of the selected vocal parameters in order to identify and discuss differences and similarities, as well as limitations and potentials of the two different ways of evaluating and measuring the vocal process in each case over time.

One case was chosen for a triangulation in order to examine the validity and reliability of the psychological interpretation of the measured vocal parameters.

The dissertation closes with a discussion (chapter 10) of the findings and the answers to the main and sub questions of the study. The focus of the discussion is to some extent how relevant the voice assessment tool may be for and in clinical practice. The results are related to previous and recent literature. This leads to reflections about further perspectives and a possible re-design of the VOIAS.

Moreover, this section contains reflections and suggestions for future research leading to a final conclusion.
Vitality is a whole.

Daniel Stern
4. Clinical Approach as part of the research method

Introduction
As I wrote in chapter 3.2 “Reflections on the ontological issues”, the validity of the music therapy research study is enhanced by precise information on which interventions were used how, when and in what context (Bonde 2005).
In general the literature review revealed a huge lack of attention towards the human voice within music therapy and at the same time the voice as a possible source for information about affects and emotional states of a client.
Furthermore I became aware of the importance of clarifying my approach to and understanding of body and voice work when I presented my research study at the PhD courses at Aalborg University, in order for colleagues to understand the psychological interpretations proposed. The client and the clinical practice are closely connected to every step I take throughout this study, and I will later propose a psychological interpretation in connection with a quantitative analysis in chapter 8.

My own experience with body- and voice work goes back a long time, and over the years I have gradually developed core techniques and a working method, which I today use in a very structured and analytical way. In developing both a protocol and a design for a voice assessment profile it is essential that the applied exercises are realistic.
Therefore, I include my clinical approach as part of the research method in the study. However, it is not the aim of this chapter to provide a detailed description of the vocal organ and how sound is produced. For a more detailed description of the principles of voice production and the vocal organ as a whole the reader is referred to either Dayme’s (2009) Dynamics of the Singing Voice and Sundberg’s (1987) The Science of the Singing Voice.

Chapter 4 starts by describing the theoretical pre-understanding of Psychodynamic Voice Therapy in chapter 4.1. Then follows chapter 4.2, describing the potential neuroscientific basis for the awakening of body and mind within the framework of Psychodynamic Voice Therapy. This is done in order to follow up on the physical as well as psychological effect of body and voice work.
The theoretical and clinical background of the core techniques in Psychodynamic Voice Therapy are described in chapter 4.3 - 4.8. This includes the listening perspectives and a section summing up the vocal parameters extracted from the method Psychodynamic Voice Therapy.

4.0.1 Theoretical pre-understanding of Psychodynamic Voice Therapy
“Psychodynamic Voice Therapy” is a method and approach using “body and voice” as a primary instrument in music therapy. The method contains different core techniques, which I have developed over the years since
1999, and today I use it in a very structured and analytical way. First I will however describe the ontological and epistemological background of the project: the theoretical inspirations underpinning Psychodynamic Voice Therapy.

“Psychodynamic Voice Therapy” (PVT) combines influences of my music therapy orientation and vocal training, as well as my clinical and teaching experience. This comprises my music therapy education at Aalborg University, Denmark, and special vocal training by Carol Mendelsohn and Saule Ryan, Centre Artistique International Roy Hart, France.

4.0.2 The training program at Aalborg University
The Aalborg training program is a five year full time study ending with the degree of Master (MA) in music therapy, and it qualifies the student both in the clinical use of music as/in therapy and at a scientific and academic level. The training program is founded on a broad psychodynamic and humanistic tradition and world-view, and with an eclectic approach. The program acknowledges a multi-paradigmatic understanding and approach of music therapy, and the students are trained to be aware of how the different perspectives may influence clinical practice as well as theoretical understanding of music in / as therapy. Health and disease are not considered dichotomous, but rather as something which involves a complex interplay of body, mind and soul in the many contexts of life and culture. This multi-paradigmatic understanding is also connected to a broad understanding of music, where music and sound are considered both a concrete physical stimulus, an aesthetic form with its own production rules and a universal source of knowledge and consciousness, while meaning is produced in the process of musical creation as well as in the process of musical perception (Wigram et al. 2002).

Some core details in the music therapy training program in Aalborg, which have highly influenced the approach of Psychodynamic Voice Therapy are contained in the training track of “Experiential Training in Music Therapy” (ETMT). The ETMT means that the students for four and half years are placed first in the role of “student-client”, and gradually more and more in the role of the “student-therapist”. The basic method of ETMT was originally developed by Mary Priestley in the early seventies where she privately offered individual music therapy and inter-therapy as a supplement for the training of students from different music therapy training courses. Among those students were Inge Nygaard Pedersen and Benedikte B. Scheiby. Inge Nygaard Pedersen has all along been one of the primary ETMT-teachers, and she has also been the main responsible teacher of this training.

The main purpose behind the ETMT is:

“… to emphasise the artistic and “sensitivity” training of the students, to make them aware of themselves as the resonating tool for music therapy work, and from there to build bridges to their consciousness about methodological possibilities with different client populations. Knowledge is acquired about the connection between their way of understanding people, music, health, and therapy, and their theoretical foundation and choice of method.”

(Pedersen 2002, p. 170)

1) Carol Mendelsohn joined the Roy Hart Theatre in 1983 and followed their training to become an actress in the company and a voice teacher. Mendelsohn teaches widely internationally. Saule Ryan joined the Roy Hart Theatre in 1970. He has furthermore studied movement and mime intensively and integrated this in his teaching. Both Mendelsohn’s and Ryan’s teaching like to bring out the actor in everyone by calling upon archetypal characters and situations that require a direct, physical engagement of body, voice and the imagination. It is a playful approach to voice teaching that encourages the pupil to “forget” about technique and allow himself/herself to tap into the immense source of creativity and spontaneous communicability.

2) Inge Nygaard Pedersen is professor in music therapy at the Dept. of communication and psychology at Aalborg University, Head of research at the Research clinic at Aalborg Psychiatric Hospital, Denmark, and together with Benedikte B. Scheiby she founded the education of music therapy. Pedersen (2002) p. 170)

3) Further information about the history and how the method has developed over the years, can be found in Pedersen’s article “Self-Experience for Music Therapy Students” (Pedersen 2002).
One of the subjects in the ETMT program is the discipline “Relational competencies with body and voice”, which focuses on self-experiential learning through body and voice awareness and experiences. Since 2005 Inge Nygaard Pedersen and I have collaborated in developing and teaching in this discipline. In the work with body and voice as an instrument in music therapy this training and learning through self-experience is essential. It offers the student the possibility of learning something about the pre-conscious bodily awareness by studying the phenomenon of the body experience through the practice of *listening* and *observing*. Though reading does stimulate ones potentials, reading a lot about something still is someone else’s thoughts and experiences, a kind of “hearsay” for the reader, because he or she has not experienced or sensed it. Put in another way you do not know it, you only know something about it. This hypothesis is supported by Charlotte Lindvang’s research study (2010) “A Field of Resonant Learning”, which explored and generated understanding and insight into the phenomena of self-experiential learning processes from the perspectives of music therapy students. The focus was what they learned from being in the client’s position during the training. This was then contextualised clinically and professionally in her investigation of how professional music therapists in Denmark evaluated the influence of their earlier self-experiential training on their current clinical competencies.

Results showed a very clear tendency for the respondents to have great self-confidence and feel very secure and self-confident in their clinical work. The same goes for the music therapists who were newly educated (2007 - 2009), which is very interesting since the literature reports show that novices generally feel very insecure in relation to clinical work (Lindvang 2010). These music therapists, however, have developed an insight, and this insight has grown from within, through their experiences on their own bodies in ETMT. This was supported by a specific result that says that the competence of “meeting the specific client” was on the whole the competence that the qualified music therapists felt most confident about, and it was at the same time the competence that most of the music therapists evaluated as being developed with a high degree of contribution from self-experiential learning (Lindvang 2010).

Summing up ETMT offers “training in learning not only to listen in order to analyse the client or the client’s music, but also to listen to oneself listening to the client” (Pedersen 2002, pp 170). Therefore ETMT is the foundation of the training behind the *listening perspectives*, and a very essential part of Psychodynamic Voice Therapy. These will be defined and described further in chapter 4.8. In listening the human voice becomes a non-verbal tool of orientation towards the client as well as towards oneself.

4.1 “The extended vocal training techniques”

Mendelsohn and Ryan are both voice teachers from Centre Artistique International Roy Hart in Malérarque, France. The education I received from Mendelsohn and Ryan ran over many years and included intensive workshops and a teaching diploma running over a two year period where this voice training was intensified focusing on the special vocal training method “The extended vocal training techniques” founded by Alfred Wolfsohn and Roy Hart.

Alfred Wolfsohn (1896 - 1962) was born in Berlin of Jewish parents. At the age of 18 Wolfsohn was a soldier in the First World War, and afterwards he developed *shell shock* or *war neurosis*\(^4\). With an intense feeling of guilt Alfred Wolfsohn kept hearing in his head and ears the cries, groans, screams and yells from a comrade he had refused to help and rescue in order to save himself. In his search for a way to heal himself from these traumatic experiences, Wolfsohn consulted different psychoanalysts, doctors, psychiatrists, and voice teachers without success. He finally found his cure after many tries in his development of a multi-octave voice training technique. This technique evolved when Wolfsohn got the idea that if he tried to match the intensity, quality and pitch of the

\(^4\) Today shell shock and war neurosis is recognised as Post Traumatic Stress Disorder (PTSD)
Chapter 4

cries, groans, screams and yells he heard, he might be able to sing them out of his body and mind. In exploring the nature and possibilities of the human voice, Wolfsohn revealed the potential of not only an instrument of artistic expression, but also of human development and therapy. (Newham 1997)

Roy Hart (1926 - 1975) was a gifted actor with a scholarship to the Royal Academy of Dramatic Art in London. Hart met Wolfsohn in 1947 and worked on the voice with him for 13 years before he died. There is an old saying: When the student is ready, the master will appear. When Hart met Wolfsohn and his vocal training techniques he dropped his promising career to study with Wolfsohn, and did not perform in public for seventeen years. (Newham 1997)

With Wolfsohn, Hart extended his vocal capacity in many ways. Hart’s gift as an actor together with his developed vocal capacity resulted in a co-operation between him and Peter Maxwell Davies (b. 1934), an English composer and conductor, about a music drama, “Eight songs for a Mad King”. This piece had its world première in London Spring 1969, and made chamber music-theatre explode into prominence as a dominant genre. (Pruslin 1987)

The extended vocal training technique has been used and transferred from person to person - from master to student since Alfred Wolfsohn's days. It is a working tradition, which is not written down as a specific method. The theoretical foundation of this technique is based on practical intelligence and tacit knowledge. This knowledge is based in a group of people living and teaching round the world from Centre Artistique International Roy Hart in Malérarque, France. Within this training tradition there is an allowance of letting your own working method evolve and take form.

Further it is important to notice that most of my clinical experience is within psychiatry. My working experience comprises 25 years all in all, including years before, during and after studying music therapy. During the last years, because of my doctoral study, the clinical work has been focused on a client group suffering from moderate to severe depression (see chapter 5 for a description of this diagnosis). My teaching experience on the other hand is both within “Relational competencies with body and voice” in the music therapy training program in Aalborg, “Developing vocal and movement potentials” within drama, and voice workshops focusing on vocal and personal development.

4.1.1 The human voice

I consider the human voice a holistic phenomenon, and my understanding and approach to the human voice is holistic. Holism refers not only to the connection of body, mind and spirit but encompasses all aspects of the human voice. The human voice is the instrument we are born with, and it is an essential part of how we communicate and express our needs, emotions and state of being in the meeting with other - the world.

Just as the human being is given a unique fingerprint, the human being is given a unique voice. Each individual has her/his own “voice print” - just as distinctive as a fingerprint. The sounds made by the human babies are named primal sounds or natural sounds. These sounds are involuntary, spontaneous, and spring from emotions (Austin 2008, Brown 2004, Dayme 2009, Chapman 2006). Human adults also use natural sounds - such as crying, howling, wailing, laughing, calling, spontaneous joyful exclamations, grunts, the vocalised sigh and yawn, and the sound of agreement (mmm). The nerve centre for the emotions lies in the “lower brain”. There is a direct connection from this area of the brain to the cortex or “upper brain”; the part with which we think. The natural sounds are part of a whole pattern of responses involving the body and mind in a holistic way. For example, when I accidentally hit my little toe on a chair or table-leg, my spontaneous response is a vocal “Aaaargh”-sound. This response will not cause me to think about taking in a particular sort of breath or setting my vocal mechanism in a particular fashion. My cry of pain will come as part of a neurological link to the vocal mechanism and
include a whole network of other stimuli in the body. (Brown 2004, Chapman 2006)

Recent research shows that immediately when a child is born there is a primary intersubjective attunement in reciprocal subject-subject format of proto-conversation. It is an inter-personal communion, in which participants attend and attune to one another’s emotive expressions and gesture- and sound-producing movements, inviting semblant re-enactment and affect attunement (Bråten and Trevarthen 2007, Bråten 2009, Stern 2000). Bråten (2007) names this altercentric mirroring and self-with-other resonance in an intersubjective matrix. Bråten (2007) further describes how the very first sound that a 45 minute old child may attempt to imitate and succeed in pronouncing is an /a/-sound. First at twenty weeks old the child shows an attempt to imitate /u/ and /i/-sounds. Furthermore the human baby very quickly adapts to the culture it is born into, by quickly learning to exclude sounds, which do not represent the culture it is born into. This happens long before the acquisition of meaning. Around 6 months infants begin to narrow their perceptual space; first to vowels and next to consonant sound distinctions that make no sense in the native tongue the baby is exposed to (Bråten 2009).

Studying a baby communicating displays its use of the whole body and total voice range to express its basic needs, and its frustration or satisfied sensation of its state of being (Stern 2000, Trevarthen & Malloch 2000, 2009), in other words it displays a human being in balance or out of balance. You may therefore conclude that the bodily and vocal expression of a human being constitute a profound representation of human experience and its state of balance. It includes all kinds of sounds, and our psychological (mind) and physiological (body) state of being is reflected in the quality of our voices.

My understanding of and approach to the human voice is that it is a product of our cultural inheritance and context as well as of the personal journey and interplay with the world through life. Thus it is a reflection of a human being’s “way of life” as a whole. As such it makes sense to me to consider the human being an aesthetic being with its individual conditions as Kenny (1989, 2006) describes and defines the human being. A human being’s journey through life is full of all kinds of experiences such as joy, sadness, loss, pain, relief etc., and connected to that are as mentioned before the natural sounds. So of course it is not always “aesthetic” sounds being expressed when sounding our inner experiences, in the common understanding of the word aesthetic. In the beginning of our life natural sounds are usually accepted, but very often it also happens that certain sounds are welcomed and preferred to others, and in that way a child quickly finds out which sounds are more culturally accepted than others. As time progresses we may lose contact with our natural sound for different reasons, falling into certain habits of speaking, which move us away from our natural sound.

A client once told me that she lowered her voice volume and began to whisper as a means to hide, go unnoticed. This intentional act was designed to protect herself. In contrast, another woman displaced a low voice volume because during her childhood she was told to lower her voice volume. In her adult life, she found it difficult to allow herself to raise her voice and speak up. Our “way of life”, emotions and cultural influences result in acquired habits that interfere with a free, natural voice. One example of this is that a person suffering from severe depression may present a voice sounding cracked, rusty or thin, inharmonic or out of balance. In the voice work a healing over time may take place, and the sound can grow into a mostly full, harmonic or balanced sound. The whole process then becomes a picture of living your path towards wholeness and more vitality.Kenny (2006, p. 38) writes:

“Through the profundity comes beauty; an artist’s symbolisation through sound of the basic elements which make up life experience - pain, sorrow, joy, sadness, loss, rebirth. If accepted within this attitude, such primitive expressions can form the foundation for a positive attitude toward life for a person disabled in any way.”
In capturing life as a whole with all the colours of beauty and aesthetic expression, we reach a much more profound definition than the one we usually connect to a common understanding of an aesthetic, beautiful sound.

To me personally, it was a great relief when I discovered a space where it was allowed to play with the whole spectrum of sounds: the natural, rough, animal or mechanical like sounds, as well as the more harmonic sounds. It was as if I had rediscovered the playing field within myself. But through my life, until I met this space able to contain the playing field, the so-called “ugly sounds” were clearly separated from “beautiful sounds”. And although I found an aesthetic beauty in all kinds of sounds myself, I felt very alone with this appreciation or attitude. By valuing the proposed broad definition of beauty, music therapy can offer clients a playing field for body and voice, that can support them in finding ways of freeing their voices, and enable them to sing their Self alive.

When we communicate, we tend to focus our attention on the words, but unconsciously we listen to the voice that carries the words. We listen to the timbre, harmonic quality, rhythm, movement or melody in the speech or song, the intensity and loudness of the voice. These are some of the qualities that colour our perception and (together with the meaning of the words) determine how we interpret what the person just said and meant or give us some clues to a person’s self-image and emotional health.

The sound of the voice can therefore be a tool - a mirror giving us an opportunity to “see” the person sounding more clearly, as well as what is going on within us. The human voice is an outward expression of an internal state, which will be illustrated during the triangulation of an analysis of one client later in this study (see chapter 9). This makes the human voice an essential instrument in and as music therapy.

4.1.2 The lived body and the corporeal body
The departure point of my work with the human voice as a primary instrument in music therapy is within the polarity of the lived body and the corporeal body as described and presented by the French phenomenological philosopher Merleau-Ponty (1908 - 1961). Merleau-Ponty (2002) focuses on the body and the embodied being-in-the-world, and according to him you act through the body, perceive and exist through it, even without explicitly reflecting on it. In that way the body is an unconscious centre of thoughts and actions. This means that the body in any given situation has sensed and created a meaning, before a conscious reflection is made upon it or a thought is occurs in the mind. Therefore, from an ontological point of view body and mind are not separated, but one and the same - a lived body. This worldview is integrated in the following sections describing how the human voice functions as an instrument and media within the method Psychodynamic Voice Therapy, giving a more detailed description of how this works.

4.1.3 The healing potential within ourselves
We as human beings follow a life path and move towards an experience of wholeness (Kenny 2006, Tüpkér 1988, 1996, 2001). Along this path, we are at play with our conditions (Tüpkér 1988) in order to reach the fullest potential of what we can be in the world. This view is integrated in the understanding of health presented by Bruscia (1998) who gives the following definition:

“Health is the process of becoming one’s fullest potential for individual and ecological wholeness.” (Bruscia 1998, pp 84).

Our conditions challenge both our limitations and our potentials. In expressing ourselves and interacting in the world we actualise ourselves by a creative force (Kenny 1989). Within this view is a trust that a healing potential lies within ourselves when activating our creativity. 5)

I have noticed that the potential space for the creative process is often forgotten in psychia-

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try. Within the hospital the approach of treatment and the understanding of psychiatric illnesses is still highly dominated by the natural scientific paradigm and therefore focuses on the symptoms and not on the resources or potentials. However, the recently published psychiatric handbooks in Denmark (Simonsen & Mohl 2010; Mors, Kræg-Sørensen & Parnas 2009) place the human being in the centre, acknowledging the new paradigm of psychological factors influencing the biology and the opposite way around. There is also a tendency towards encouraging a more resource oriented approach. In clinical practice.

However, there still is a long way to go before this orientation is integrated. It can be difficult to learn an old dog to sit, as a Danish saying puts it, but these books are an important first step towards the integration of this world-view in clinical practice.

In my opinion, the creative processes are closely related to what Stern calls the forms of vitality (Stern 2010), a life and healing generator within ourselves. “Creativity cannot be separated from the processes of life” and “is by no means the only path to growth” (Kenny 2006, pp 14 and pp 17). In these themes lie also a focus of life quality itself, something I personally find very important to capture and support in the treatment as a whole.

4.2 Mind, Body and Vocal Sound - The sensory system

For many years the Cartesian dualism, separating mind from body, has affected the world view of and scientific studies within the health system, and influenced the understanding of and scepticism towards the benefits of psychotherapy (Damasio 1994, Fuchs 2005, Gerlach 2006, Bonde 2009). However today this is known as Descartes’s error (Damasio 1994).

“This is Descartes’ error: the abyssal separation between body and mind, between the sizable, dimensioned, mechanically operated infinitely divisible body stuff, on the one hand, and the unsizeable, undimensioned, un-pushpullable, nondivisible mind stuff; the suggestion that reasoning, and moral judgment, and the suffering that comes from physical pain or emotional upheaval might exist separately from the body. Specifically: the separation of the most refined operations of mind from the structure and operation of a biological organism.” (Damasio 1994 pp 249-250).

Mind and body are highly integrated in most types of actions, and I find that awareness of this knowledge can be used constructively and embraced in a clinical approach based on body and voice work. Johnson (2007) refers to music as a felt body-mind-experience and argues that music is meaningful because “it can present the flow of human experience, feeling and thinking in concrete, embodied forms” (Johnson (2007, pp 236). The somatosensory system is receptive to both physical and psychological phenomena because both somatic and psychic operations are, at one level, neurological processes (Hart 2006, Damasio 1999).

To give an example, stress not only results in psychological symptoms, but also physiological symptoms and change in neurotransmitters (endogenous chemicals) as well as hormones. In addition studies have proven that the outcome of psychotherapy can significantly change functions and structures of the brain, whereas medical treatment has a more limited effectiveness (Gerlach 2006, Fuchs 2005).

Traditional therapeutic models are based primarily on the idea that change occurs through a process of narrative expression and formulation in a “top-down” manner. Psychodynamic Voice Therapy is based on the idea that a more subtle change will occur through integrating “top-down” and “bottom-up” movements in the therapeutic process.

Before deepening the theoretical and clinical background of the core techniques in Psychodynamic Voice Therapy I will describe the possible neuroscientific basis for the awakening of body and mind within the frame of Psychodynamic Voice Therapy, and in that way follow up on the physical as well as psychological effects of body and voice work.

It is not the aim of this chapter to provide a

The focus will therefore be on those main brain and body neurological and endocrine activities I find essential within the method of Psychodynamic Voice Therapy. During the following sections themes like arousal, dynamic forms of vitality and the action of self-soothing are shared as a possible aim for the psychotherapy offered. They are activated through the sensation of breathing, body and vocal exercises, and also when the therapist sings close to the client’s body.

4.2.1 The human body and voice as instrument and media
A basic understanding of sound, its elements, and the way it propagates, will support an understanding of the human voice, its nature and behaviour, and the interaction of sound with our body and emotions. The scientific study of human sound perception is known as psychoacoustics, and can further be described as an interdisciplinary science studying the psychological and physiological responses associated with sound. This includes speech / singing and music. This background knowledge may provide a better understanding of the potential benefits of Psychodynamic Voice Therapy and the listening perspectives connected to this work, and of my reasons for implying this approach with clients suffering from depression.

4.2.1.1 The physics of sound and Psychodynamic Voice Therapy
Basically sound is a mechanical disturbance of the resonating body, which among other things could be air. Sound waves are longitudinal waves, which propagate via a series of compressions and rarefactions in a medium. Longitudinal waves can propagate through all forms of matter such as air, gases, liquids, solids and plasmas. The matter that supports the sound is called the medium. (Howard & Angus 2006)

The air molecules are set in motion by the density of air, and the sound waves move like the rings in the water after you have thrown a stone in it. When the air molecules meet other molecules they try to push them out of the way, which basically means that the sound waves can set other molecules in motion and make the resonating object vibrate. When sound waves meet a human body this is exactly what is happens. Molecules in the body are set in motion and make the body vibrate and resonate. This can also be described as a sensory stimulation of the body, and sometimes we will register this as a tingling sensation in the body. (Howard & Angus 2006, Bonde 2009, Panksepp & Trevarthen 2009)

4.2.1.2 Psychoacoustic elements in clinical practice
When relating the described phenomenon to a therapeutic situation and when focusing on my clinical approach, Psychodynamic Voice Therapy, several essential things are happening, all promoting a physical benefit of the therapy. In Psychodynamic Voice Therapy one of the key exercises is to sing one single tone. I will use this exercise to explain and clarify the physical benefits by integrating the presented knowledge regarding sound as a medium.

Depending on the therapeutic situation and the client the single tone-exercise can be sounded alone by the therapist, the client, or the client and the therapist can sound the single tone together. Two things happen when the tone is sung by the music therapist to the client. The client perceives the sound wave through a sensory stimulation of the body. This can either be an auditory stimula-

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6) Susan Hart is a psychologist and the author of several books and articles on neuroaffective developmental psychology in Denmark and internationally, and frequently gives lectures and courses on the topic. Her clinical experience includes work in municipal social services and in a children’s psychiatric ward.

7) Antonio Damasio is a M.W. Van Allen Distinguished Professor and Head of the Department of Neurology at the University of Iowa College of Medicine in Iowa City. He is also an adjunct professor at the Salk Institute for Biological Studies in La Jolla. Damasio is a member of both the Institute of Medicine of the National Academy of Sciences and the American Academy of Arts and Sciences.
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4.2.2 The sensory stimulation and the triune brain

The sensory stimulation affects the nervous system and functioning as transducers of physical stimuli to the realm of the mind, producing sensory information.

The auditory system and somatosensory system is stimulated when giving sound or perceiving a sound. Both systems are part of the sensory nervous system, and are involved in the sensory perception. The sensory nervous system consists of sensory receptors, neural pathways and different parts of the brain, and is being responsible for processing the sensory stimulation and information. In the processing of music via the ear and the body many parts of the brain are involved. Put in another way, the auditory senses and sensory senses are transducers of physical stimuli either from the outside-inwards (the music therapist sounding close to the clients body) or the inside-outwards (the client sounding alone and together with the music therapist) - to the realm of the mind.

The brain is internally connected through countless circuits and is hierarchical in its structure (see figure 1), and is often described as the triune brain. (Hart 2006)

The brainstem (the reptilian brain) is the
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lowest level in the triune system and regulates arousal and the physiological equilibrium of the organism. The brainstem regions have extensive connections to the limbic system and the neocortex.

The next level, the limbic system, manages the balance between the inside and the outside world. The limbic system interprets and modulates impulses from the brainstem, and is therefore also involved in the regulation of certain emotions. Fundamentally, an event is either perceived as good or bad, and the response will either be engagement or withdrawal. Susan Hart (2008) writes:

“Emotional awareness develops through subjective sensations of pleasantness or unpleasantness in relation to particular experiences. When an event takes on particular meaning or value, the awareness is focused, and the emotional experience provides increased energy and awareness.”

(Hart 2008 pp 51)

Neocortex interacts with and analyses experiences from the outside world and processes complex information through thinking and reasoning. The neocortex may be characterised by a high degree of complexity and plasticity. With development in the neocortex comes extensive development in the connectivity of subcortical regions, which enables top-down processes. This offers the possibility of inhibitng reflex reactions and bringing subcortical functions under cortical control, like in a conscious self-soothing action. (Hart 2006)

“The magnificence of the nervous system lies in its plasticity in relation to the environment, and neural circuits can develop only when they receive optimum levels of arousal and stimulation. Both the nature and the timing of experiences are important for development.”

(Hart 2006, pp 29)

4.2.3 Arousal, dynamics and forms of vitality

Arousal is the fundamental force in any kind of sensory stimulation in the nervous system, being the basis for the feeling and sensation of vitality, empowerment, energy or a manifestation of being alive. Arousal can be conscious as well as unconscious. It can happen to anyone, - even comatose patients. The arousal system is important in that it supports the human being to think, feel, perceive, or move voluntarily. (Damasio 1999, Stern 2010)

Stern (2010) describes arousal as follows:

“To be aroused is “to be put into motion” or “stirred up” or “excited into activity”, physically, mentally, or emotionally. It is synonymous with “to animate”. In more scientific terms, it is the force behind the initiation, the strength, and the duration of almost everything we do.”

(Stern 2010, pp 58)

Affective arousal occurs through shifts in energy and usually when an external sensory stimulation coincides with the endogenous rhythms of the organism itself (Hart 2006). Synchronized movements require dyadic emotional regulation.

Body and mind are in a constant act of movement, and in the same way there is a constant ebb and flow of emotions. What changes is the intensity and duration of the movement. In addition our arousal level undergoes micro-shifts in vigilance, attention, and engagement with the passing of events. (Hart 2006, Stern 2010)

Arousal is a very fundamental force, both for body and mental activity, and therefore the application of body and voice work make significant sense in music therapy, because the sensory stimulation sets the body, mind and emotion in motion and may be explored and studied in the “here and now”. The intensity of this motion can be big or small, but basically the same. Arousal is about being set in motion or stirred up, which can be a useful technique, and is a very essential part of Psychodynamic Voice Therapy offered to people suffering from depression.

An encounter interaction and meeting with other people will always arise and effect an arousal, which forms itself into vitality affects and gives an unconscious sensation of pleasure or displeasure. Both pleasant and unpleasant feelings cause bodily sensations and trigger neurotransmitters and hormones. The process is implicit and shapes what Stern calls vitality affects, and the philosopher
Susanne Langer’s (1956) notion of forms of feelings. Damasio (1999) links the vitality affects to his definition of background feelings. Background feelings are not always conscious to our mind, and in these situations there is a tendency to focus on other mental matters or contents. Background feelings are more internally directed and may be observable to others in myriad ways like body postures, the speed and design of our movements, and even in the tone of our voices and the prosody in our speech as we communicate thoughts that may have little to do with the background emotion. According to Damasio (1999) background feelings include fatigue, energy, excitement, wellness, sickness, tension, relaxation, surging, dragging, stability, instability, balance, imbalance, harmony and discord.

A felt inner-body sensation can be caused by a hormonal shift, a muscular spasm and any movements of breathing or movements of muscles, ligaments, or bones. The inner-body sensation is constantly being generated, and contributes to the internal state of well-being or distress. (Ogden et al. 2006).

Energy, power and force in motion are terms for “dynamics”, which comprises many meanings. Alternatively, it reflects change that is in process, and is therefore the opposite of static. In music, the term “dynamics” is usually restricted to changes over time in loudness (volume, amplitude, as the product of force). According to Stern (2010) the dynamic forms of vitality are psychological, subjective phenomena that emerge from the encounter with dynamic events. The dynamic forms of vitality in connection with vocal expression are even evident when saying the same words at the same pitch. At the same time he states that the dynamic forms of vitality are more complex for different melodies.

However, in my understanding the dynamic forms of vitality are observable more clearly in music therapy when expressing your Self spontaneously in simple interventions as presented here or when creating a vocal improvisation or short melody in the “here and now”. Furthermore the affect attunement where the music therapist matches the vitality forms of the client will create an ongoing dialogue.

Therefore it is very important to train a special kind of attention and awareness, or more specifically, train the listening perspective and attitude, towards the vitality forms in the applied body movement and vocal interventions in the clinical setting. According to Stern (2010) the dynamics of the vitality forms will reveal what is hidden in the vocal expression behind the words, or in the spontaneous vocal expression when carrying out an intervention, such as the degree of authenticity, difficulty or fear in telling or carrying out the different body and vocal interventions.

The dynamics of the vitality forms will reveal the amount of excitement or engagement, distance to the narrative stance from the “here and now”, or deadness sensation or the amount of defensive blockage in the passage from mind to speech, and much more (Stern 2010). Dynamic forms of vitality therefore provide a possibility of accessing non-conscious experience, memories, and dissociated experiences.

“Vitality is a whole. It is a Gestalt that emerges from the theoretically separate experiences of movement, force, time, space, and intention. It is not analyzed in any conscious way piece by piece, any more than a familiar face is, even though each separate element could be taken aside and studied in isolation.”
(Stern 2010, pp 5)

The experience of movement (physical or mental) takes time. While a movement is happening it traces a profile of its rising and falling strength as it is contoured in time. This is its dynamic form of vitality. Imagery may be considered mental movements. Mental movement includes movements imagined such as preparing to carry out a physical movement or forming an image. In that way intentions are mental expressions of directional forces getting ready, straining to “move”, or already started and still unfolding. Just like a musical phrase, they lean forward subjectively. Because of the mirror neurons, imagining the performance of a particular action generates a
pattern of brain activity that is similar to that generated when the activity is actually performed (Stern 2010, Damasio 2010). When a person engages in mirroring another person, he or she usually involves herself/himself in the other person’s action, and tries to understand it from the center of the other person’s body and mind (Bråten 2006). Stern’s (2010) explains it as an imitation of both the action and its exact dynamic form of vitality form.

Within Psychodynamic Voice Therapy imagery is often connected to the exercise. It is my clinical experience that the metaphor theories go beyond the classical dualism between emotion and cognition, just as Bonde (2009) points out in his book “Musik og menneske. Introduktion til musikpsykologi”. This is supported by research from neuropsychology, which has demonstrated that there is a close relationship between emotions/body and reason/consciousness (Damasio 1994, 1999, 2010; Lakoff & Johnson 1999; Johnson 2007, Bonde 2010).

An example from clinical practice is when I work with a glissando movement and then introduce the client to imagine her/himself the possibility of reaching higher or lower notes on the scale. It is both my clinical and my personal experience that imagining this actually supports the ability to reach higher or lower notes. This can be even further supported by showing the client with your hands where to reach, or using a body movement following the sliding motion at the same time.

Sometimes it is very difficult or even impossible for people suffering from depression to imagine that the present experienced state can change. It is my clinical experience that the introduction of different types of imagery awakens the ability to imagine possible actions. The integration of imagination while carrying out the body and vocal exercise supports the outcome of the vocal exercise and supports change on other modalities.

4.2.4 The “bottom-up” and “top-down” processes
Describing the practice of Psychodynamic Voice Therapy from a possible neuroscientific basis I would therefore conclude that the use of body and voice work blends theory and technique from cognitive and dynamic theory with focus on somatic awareness and movement and vocal interventions, such as helping the clients to become aware of their bodies, track bodily sensations, and implement physical as well as vocal actions that promote empowerment and competency. Within this approach the clients are taught to observe or rather “listen” to themselves, and study and explore the relationship between their physical sensations, postures, movements and voice, and how these affect their emotional and psychological state as well as influence the words and content they describe in therapy. This could be described as a unified body-mind approach of the treatment.

This approach includes a bottom-up and top-down processing, which is the description of the two directions of information flow. This interplay holds significant implications for the occurrence and treatment. It is the interplay in these two processes that holds the implications for how Psychodynamic Voice Therapy operates. Damasio (1999) writes:

“Physical actions are creating the context for mental actions; bottom-up processes are affecting upper level processes. (This is) the feeling of what is happening”
(Damasio 1999, pp 27)

In the psychotherapeutic work with body and voice as the primary instruments I am very consciously blending bottom-up (sensory stimulations) and top-down (cognitive approaches and verbal dialogue) interventions. The entry point to the psychological process is always the sensations and movements of the body and the human voice, which means that the sensorial experience is explored and used to support self-regulation, as well as a method to come closer to your Self in order to come to know your Self more. During the exploration new experiences emerge as it is lived, pre-theoretically and pre-reflectively (Stern 2010) and expand your living space - a concept drawn from the understanding of Merleau-Ponty (2002) as mentioned in the section about the basic
theoretical principles behind the awakening with body movement and sound (chapter 4.4).

According to Damasio the cognitive processing is inextricably linked with our bodies. Bodily feelings, or “somatic markers”, as Damasio names them, influence cognitive decision making, logic, speed, and context of thought (Damasio 1994, 1999).

A way of creating a physical sense of control is by working on the establishment of physical boundaries, exploring ways of regulating physiological arousal (here using breath/voice and body movement), and focusing on regaining a physical sense of being able to defend and protect ourselves. The stimuli ascend to the cortex, to the centres for perception, emotion, movement, and cognition, and almost all parts of the brain where they adjust sensitivity to stimuli, motoric activity, emotional responsiveness, and cognitive activity. (Stern 2010, pp 60)

### 4.2.5 Singing and well-being

It is proven that attachment behaviour triggers the release of endogenous opioids and then reduce discomfort at the same time as the sense of satisfaction is increased. Facial expression, looking, listening, sucking, swallowing and vocalization will activate the parasympathetic and engage responsive attention. Touch, voice or eye contact, which is a familiar experience as soothing, enhance relaxation through the release of oxytocin. (Hart 2006)

Oxytocin produces a warm, light, loving feeling, which encourages attachment in couples, and it helps to create the calm needed to engage in social interactions and attachment formation. Oxytocin supports the formation of attachment bonds between mother and child and in friendships, love relations, and social preferences among adults. Oxytocin triggers self-calming behaviour by lowering activity in the sympathetic nervous system and activating the parasympathetic nervous system. It is a calming and anti-aggressive hormone, and women have far more oxytocin receptors than men. In both male and female rats, oxytocin has a physiological anti-stress effect. If rats are injected with oxytocin for a period of five days, their blood pressure and stress hormone levels drop (Uvnäs-Moberg 1998 in Hart 2009).

Oxytocin is released, for example, when a woman is in labour or when she breast-feeds, and it promotes maternal behaviour. Soothing stimulation such as touching and warmth raises the oxytocin level. (Hart 2009)

When a mother soothes and comforts her child, she regulates the child’s oxytocin level, because the oxytocin is released as a result of sensory stimuli such as facial expressions and vocalization that express warmth and safe familiarity (Hart 2009).

The parasympathetic nervous system can be activated by soothing and comforting actions that affect the oxytocin level due to sensory stimuli such as facial expressions, tone of voice, and touch expressing warmth and recognizability.

A study explored the possible beneficial effects of singing on well-being during a singing lesson, engaging eight amateur and eight professional singers. The professional singers had attended singing lessons for at least six months. Among the utilised tests were used a five Visual Analogue Scales (VAS: sad-joyful, anxious-calm, worried-related, listless-energetic, and tense-relaxed) scored before and after the singing lesson, and a semi-structured interview was performed. The result from this empirical research supported the belief that singing promotes well-being. Oxytocin concentration increased significantly in both groups after the singing lesson. Amateurs reported increasing joy and relatedness (VAS), whereas professionals did not. However both groups felt more energetic and relaxed after the singing lesson. The amateurs used the singing lessons as means of self-actualization and self-expression as a way to release emotional tensions. (Grape et al. 2003)

Furthermore, different studies have been carried out with focus on choirs. Beck et al. (2000) measured the level of cortisol and secretory immunoglobulin A (sIgA). Cortisol is a measure of stress and sIgA is an endocrine defense against infection in the upper respiratory tract. It is generally considered...
favorable if the level of cortisol decreases and the level of sIgA increases. In Beck et al.’s study the cortisol results were variable and inconclusive, but an increased level of sIgA was found and suggests that active participation in singing may enhance immune system functions.

Bailey et al. (2005) investigated the effect of 1. group singing, 2. isolated listening and 3. social listening. It was found that group singing was more beneficial than either isolated or social listening. The beneficial factors identified included: (a) improving the concentration, (b) providing an exhilarating experience, (c) promoting a kind of high, and (d) improving mood. The results indicated that group singing promotes arousal on a variety of behavioural dimensions.

Another study by Clift and his colleagues (2010) focusing on singing in a choir, identified six commonly proposed mechanisms that link singing with wellbeing: 1. engenders happiness and raised spirits which counteract feelings of sadness and depression, 2. focuses concentration, 3. controls breathing which counteracts anxiety, 4. provides social support, 5. involves education and learning, and 6. involves actively.

4.3 The basic theoretical principles behind the awakening with body movement and sound

The starting point of any Psychodynamic Voice Therapy session is to nourish the awakening of the client’s awareness towards her-/himself and in being present. It is also to stimulate the client’s overall arousal and energy level. This is accomplished by bodily, breathing, and vocal movement exercises, which all have a role in the function of grounding and centring the client. The different exercises support the client in creating both a physical and mental sense of grounding and centring, and is fosters in the client a sense of being present in the moment. Often the client is either overwhelmed by the cognitive activity, such as having many thoughts running in all directions and disturbing the ability to concentrate, or is overwhelmed by emotions like anxiety as part of their main psychiatric problem. It is further my clinical experience that the client’s psychological state clearly affects the body posture, breathing pattern, freedom of movement, heart rate etc., and there seems to be a tendency to stabilize oneself through tension and rigidity rather than through a flexible, integrated body with solid support through the legs. This understanding is supported by Lowen (1972, 1975), and Ogden et al. (2007). Therefore, generally speaking, somatic resources that involve awareness and movement of the core of the body (centring, grounding, breathing, vocal exercises and alignment) may provide a sense of internal physical and psychological stability, and teach the client how to recognise the feeling of being centred and grounded, and in that way support an autoregulation, and the experience of being present.

A grounding and centring feeling will foster an experience of being in contact with a personal and psychological “platform” or foundation within; - a kind of inner private base or “private space” following Pedersen’s definition of the three imaginary spaces of being present and communicating (Pedersen 2000, 2002, 2007). In order to feel secure enough to dare explore the possibilities or opportunities as well as the internal experiences, thoughts and feelings it is essential to establish and have contact to this “private space”. This I relate to expanding a living space - a concept drawn from the understanding of Merleau-Ponty (2002), and experience the subjective world as it is lived, pre-theoretically and pre-reflectively (Stern 2010). This provides a starting point for working with the vitality forms and the feeling of being alive (Stern 2010).

In the exploration of the living space I follow the basic principles of the three imaginary spaces of being present and communicating defined by Pedersen (2000, 2002, 2007). These three imaginary spaces, a private space, a social space and a soloist space create a solid
theoretical foundation for exploring and developing the Self and developing an understanding of Self.

The setting for exploring the living space in Psychodynamic Voice Therapy is offered in a so-called musical space, which Kenny (1989, 2006) defines as a field of existence explored and shared by the client and the therapist through sound. In Psychodynamic Voice Therapy I therefore name this space the sounding space. In the meeting between the client and the therapist a self-motivated action is created and takes form as the intention to engage, grow and expand into the field of play, as well as to develop wholeness.

I always guide the client stepwise through the different core breathing, body and vocal movement exercises. Each single exercise is modeled for the client by me and built up in relation to what I observe in a broad sense. In other words, the program has some core exercises, but will be modified to suit the individual client, and those observations I make, or the sensations, experiences, and feelings the client possesses in carrying out the exercises. In the process I have to be aware of establishing and maintaining a reasonable distance between myself and the client, ensuring that I am close enough to offer support, but not too close to overwhelm the client.

The core principle behind the breathing, body and vocal movement exercises is to establish a focus either on the body, the breathing, or the vocal movement, and then mindful follow the movement closely with all the attention and awareness which can be established, while non-judgmentally noticing the sensory sensation being awaked in the moment.

Today mindfulness is a very common and popular term, and one of the strong psychotherapy methods and approaches integrated in the health system is called Mindfulness-Based Cognitive Therapy (MBCT). Therefore I find it necessary to clarify the understanding of mindful in the context of Psychodynamic Voice Therapy. There is a small but very important difference in the approach of mindfulness. As a way of clarifying the difference I will focus on one of the many different exercises in the MBCT-manual (Segal, Williams & Teasdale 2013), named Mindful walking, that is similar to the very first exercises carried out within Psychodynamic Voice Therapy.

Mindful walking is described as “meditation in motion” meaning being present in each step. The exercise is carried out in a certain way, which could be described as walking in slow motion. The awareness is directed to follow each tiny sensation of muscle change and physical sensation in the feet and legs while slowly walking and moving forward. Put in another way the awareness is focused on the mechanical sensation of walking, the knowing of walking, and could therefore also be described as a top-down process.

The way I understand the MBCT-based mindful walking is that it diverts the focus of attention and awareness, which is similar to the act of diverting the focus from negative to positive thoughts. In Psychodynamic Voice Therapy the sensory stimulation supports a sensory sensation of grounding established from within. Put in other words a bottom-up process, which when reaching the mind is supports the mind to focus, and then supports the client to direct the awareness and to concentrate. It is an important part of the client’s process in embodying her/himself, that the client possesses a non-judgmentally attitude when notifying the sensations, experiences, and feelings being awaked while carrying out the exercise. This sensory approach reinforces the client to come closer to the sensation felt in the body, and is as such an embodied way of being present.

This statement is supported by my clinical experience, where I have tried out both ways. The feedback from clients as well as my own experience is that the sensory stimuli support a more subtle embodied grounded sensation.

While carrying out the movements I may have a dialogue with the client about what is sensed, experienced and felt. However, sometimes the client exhibits difficulties in identifying and describing in words what is sensed, felt or experienced, or even sensing,
feeling and experiencing anything at all. In the latter case I provide a “menu” of sensation vocabulary or even describe what I see and hear. You might say the dialogue represents an awakening of a consciousness towards being present, a lived experience, and inner experiences and sensations. Stern (2004) formulates the basic assumption that change is based on lived experience. He writes:

“The basic assumption is that change is based on lived experience. In and of itself, verbally understanding, explaining, or narrating something is not sufficient to bring about change. There must also be an actual experience, a subjectively lived happening. An event must be lived, with feelings and actions taking place in real time, in the real world, with real people, in a moment of presentness.”

(Stern 2004, pp xiii)

4.3.1 Flow - being present - embodiment

In order to achieve the sensation of being present, grounded and centred, as well as nourish the awakening of listening to oneself, there is an ongoing attention towards the doings of the body, breathing and sounding movements. In each exercise I continue until I observe flow in the movement. When flow is present in the doing of any of the exercises, it is my clinical experience that the exercise is embodied and stabilized within the moment of the action, and then creates the centring grounding basis of being able to tolerate, contain and study the sensations, as well as the emotions evoked and released by the work. Flow can be observed when the exercise has found a rhythmical unconstricted movement in the doing. It is my clinical experience that this reflects that the client is opening up both body and mind. If however the rhythm is abrupt and constricted, it may reflect that the client is closing off, withdrawing, holding in or holding back whatever is difficult to handle and be connected to emotionally in the situation. This understanding is supported by Lowen (1975) and Ogden et al. (2006).

According to Lowen (1975), flow is the core behind his energy concept bioenergetics. Bioenergetics examines the interplay between body and mind in order to understand human personality. The concept of flow according to Lowen (1975) denotes a movement within the organism, which best can be exemplified by the flow of blood through the body. The flow can be disturbed by blocks of muscular tension and rigidity and lack of spontaneous movements can be observed. It is my clinical experience that blocks of muscular tension prohibit an integration of thoughts and feelings, and indicate the withdrawal of feeling. In clinical practice I furthermore often observed a “splitting” of the head and the rest of the body as well as a “splitting” of the two halves of the body by a ring of tension in the diaphragmatic area. This prohibits a deep abdominal respiration, a provides a loss of being embodied and grounded as well as experiencing the power to contain and hold difficult emotions.

Another similar understanding of a motion (body movement, breathing movement, or vocal movement) being embodied and integrated is Stern’s two records strands of representations: the “dynamic vitality strand” and the “content-modality strand”. He writes:

“… the dynamic vitality strand is the most fundamental and primary. The content modality strand must be encoded along or around (so to speak) the dynamic vitality strand. The content strand takes on its phenomenal form and appears to us only when it is twisted around the dynamic vitality strand.”

(Stern 2010, pp 25)

Though Stern suggests that this is so much more than just an embodiment I am of the opinion that this is describing the process until something is being embodied. I agree that without the dynamic vitality strand, the content modality record would be digital and would never take on the analogue dynamic flow of the human activity. There would be no flow, no vitality, and no aliveness (Stern 2010, pp 25). It makes me think of “the way of the bow”, which is useful to have in mind when practicing the different movements in order to achieve a state of being; a lived experience.

Some years back I was shooting with long-bow. I especially remember one situation: the
situation which convinced me to buy a longbow for myself, and start practicing. It was the experience of having been sitting and watching a group of people trying to hit a target for a long time. Finally I could not resist the temptation to try myself. I got the longbow in my hands for the first time in my life. But without any consideration or thoughts I just placed the bow, looked at the target and let go of the arrow. To my surprise I hit the target. Within a few seconds I experienced the ease, which can be behind a quite complex body movement, which is exercised uninhibited and freely. A state of being where you as a person let go, not trying to have control of your mind, but instead, without any considerations, devoting your full awareness to a moment of being present, a lived experience. It took me time to reach that sensation again, because the mind and emotions came in the way. I now made an effort to do it right, and had inner expectations, demands, aims etc., conditions which may prohibit the act of freeing the potentials within.

Focusing on singing or sounding the sensation of ease in the same way will emerge if you give in, and stop worrying about the quality of the sound, if the melody is right, how other people will judge the sound, to unnecessary tension in the body e.g. When a client enters such a state of being - lived experience - he or she often as an example has experienced a sudden experience of perceiving the colours in the room as more clear and bright.

The mind will provide the conditions that most likely will prohibit the ease sensation for the client in clinical practice. As an example it could be negative thoughts, or an inner critic. The conditions could also be low self-confidence and self-esteem, an inner impatience, or the anxiety of showing your Self. The plain fact of being out of balance mentally or physically as a human being will have consequences for the ability to be present in the moment and will contain as well as connect to difficult emotions. As always, a lot of practice is needed. In the beginning there has to be a constant interchange of information between body and mind until the movement exercise of breath, body and sound finally just happens by itself and has found its form and the mind lets go, and the human being is living the movement, being in flow.

4.3.2 Focusing on the breathing and sounding pattern
Breathing may seem a simple process not requiring any thoughts. However the breathing process can easily be affected by subconscious activity and complicated by the emotions and the physical state of the body. Breathing is directly related to the regulation of energy and arousal, which means that we breathe faster and harder under exertion and slower and deeper during relaxation (Ogden et al. 2006).

Besides supplying the body with oxygen and removing carbon dioxide, breathing also makes it possible to make sound and being expressive of your Self.

Normally breathing is an automatic function continuously fine-tuned without willpower interference, happening automatically and unconsciously, also while speaking. However, breathing can also be affected by the will. Focusing on breathing together with a body movement or while singing and sounding offer the opportunity of focusing consciously on the respiration, and underpins a regulation of flow between the inhalation and exhalation by the will. A normal relaxed / resting breathing, also named eupnea or quiet breathing, is an economical use of muscle activity, in a regular rhythmic pattern of ventilation (Dayme 2009).

Inhalation is always an active process requiring muscular contraction, while quiet exhalation is predominantly passive, due to relaxation of the diaphragm and of the respiratory muscles. During quiet breathing, the predominant muscle of respiration is the diaphragm. Respiratory muscles are controlled by nerve cells that in turn are controlled by a senior respiratory centre in the brainstem. This centre sends rhythmic
impulses, as well as receives signals from sensors around the body, which includes registering blood pH and its content of oxygen and carbon dioxide. In addition, the centre receives impulses from the cortex, muscles, tendons and joints in relation to muscle activity. Bodily organization may reflect traumatic reactions (e.g., hyperarousal, held breath, constriction, collapsed chest and shoulders, trembling), or the physical signs of competence and well-being (e.g., deep, regular breath, physical alignment or length in the spine, flexibility and relaxation) (Levine 1997 Ogden & Minton 2000)

When I observe that the client’s movement is in flow I ask the client to continue the movement, but now focus on the breathing pattern, asking the client to inhale, and prolong the exhalation by sounding the consonant “Sss” or “Fff”\(^8\). The prolongation of the exhalation indirectly affects and decreases the tempo of the body movement, so the tempo within the body of the client is decreases giving a sensation of calmness. And again it is the achievement of flow between an inhalation and an exhalation which is in focus for the practice of this exercise.

It is my clinical experience that when a client is in a state of flow the exhalation will be prolonged. This is hardly perceptible to the client, and may often be one of the issues the music therapist addresses and verbalises, thus bringing the experience into the consciousness of the client as mentioned earlier.

Breathing exercises are a mandatory integrated part of warming up and grounding the client before continuing with the vocal exercises. Independent of the character of the breathing exercise there are some basic requests in the breathing process. My clinical experience is that many clients are not very aware of their breathing process, and in those cases where they are aware of it, it most often is because they have a sensation of not being able to breathe freely. In asking the client to imagine smelling something very nice like the scent of a favorite flower, this will stimulate and activate the reflex control of breathing and cause a deeper breathing, which will naturally activate the abdomen muscles. I have developed a habit of observing the breathing duration, if the breathing is shallow or deep, centred more in the chest or in the belly, is fast or slow, and so on. It is my clinical experience that breathing is a very essential factor to establish the feeling of control and basic trust. I have found that this is a well known method also within yoga and sound medicine (Perry 2007) and many other disciplines.

4.4 The process of awakening with body movement in clinical practice

The first thing I do is to ask the client to walk with me in the space and be in motion. Then I direct and guide the client’s attention towards the feet and their contact to the ground. I may ask the client to skate over the ground and imagine the sensation of ice-skating in the body, or I may ask the client to do other similar movement exercises. The core of this first movement exercise is the foot’s skating contact to the floor where a sensory stimulation sets an arousal in motion. The basic principle in the movement makes the foot have full contact with the ground while being in motion. This literally establishes adequate contact with the ground, and supports the client in getting a sensation and feeling of contact with the ground and the feet, and not only having a mechanical sense of contact to the ground.

When I observe that the client’s movement has found its form and structure rhythmically and unconstricted, and this goes on continuously, the movement can be described as being in flow. In achieving flow in the movement there is a potential for the client to have the movement go on automatically, and change focus for awareness on the breathing pattern. I then ask the client to inhale, and prolong the exhalation by sounding the consonant “Sss”. This is done in order to support a more subtle sensation of contact to the ground.

Following up on the awakening and the emergent contact to the ground in the warm up, I ask the client to find a spot where it feels

\(^8\) The “Fff-sound is experienced as more gentle and not as provocative as the “Sss-sound”. This may be an important clinical choice based on the observations done in the situation.
comfortable to stand still, and then place the feet parallel to each other on the ground. The distance between the feet will have to match the size of the hips to balance a good line from the hip, all the way through the knee, ankle and foot in order to support a fundamentally good posture. In this body position I guide the client to sense the front part and the back part of the foot, placing and holding all the body weight in this position for a little while, without either lifting the toes or the heel. Holding these two outer points with all the body weight placed in either of these points supports the client to a more subtle sensation of the foot as a whole.

When performing this small exercise I often observe that tension is built up in the shoulders and arms as if the client is holding on to something and is afraid of falling. When observing this I make the client aware of this tension, which usually is not noticed by the client before I mention it, and ask him or her to let go and allow the arms to hang freely, and hold this body position with minimum use of muscle tension. Shaking the shoulders often helps to let go of the tension. Lowen (1975) describes that the anxiety of falling is an existential anxiety form, and he notices how a downward movement always is more frightening than an upwards movement. This is in fact a paradox, because the relief and safe feeling occurs in letting go, because then it is possible to sense the ground and centering feeling within. However, Lowen (1975) further describes that the working through of this anxiety, in building up an energetic connection between the feet and the ground, is essential in order to be able to feel a contact with the ground, and being able to hold the ground.

In clinical practice the work is both to challenge and balance the evocative in the moment of an applied exercise. Between letting go, the sensation of falling and the evocation of an existential anxiety feeling, there is a balance of tolerance in the moment. Then follows a small movement between these opposites (the extremities in the foot). In sensing the two opposite body positions I now ask the client to start a gentle and light movement between the front and the back part of the foot. An image can support this sensation and I may ask the client to imagine being moved very gently by the wind like if the wind may put a bulrush very gently into motion.

When flow is established in this motion I change the focus of the client’s awareness to sense and imagine crossing a central point in the feet. In finding this centre, the movements between the two outer points in the foot are made smaller and smaller until finally stopping the motion on the centre point in the foot. The sensation in this centre will be like sensing the whole foot at the same time.

While performing the movement and standing in the centre, the client is then guided to maintain a position where the knees are bent a little, creating a sensation of flexibility or elastic movement in the knees, without being tense. Tension or figuratively lacking force or effectiveness in the feet and legs, and locked knees create an illusion of security and diminish the experience of feeling grounded. Locking the knees creates a tremendous pull on the whole torso, making free or flexible vocal output and expression almost impossible (F.M. Alexander in Heirich 2005), while simultaneously inhibiting the body from having an energetic flow (Lowen 1975). The inhibition of an energetic flow in the body will suppress the feeling of being centered and grounded. These exercises are about working with an inner feeling and sensation of centre, flexibility, grounding, focus, and balance. If the body is out of balance by being tense and tightened up, it becomes stiff and easy to knock over.

A good analogy for the “state” of the body and the function of these exercises is that it is kind of a “Tumbler-technique” where the principle is just like this type of toy that can tumble over and then it straightens up by itself, because it has a weight in the base, a good centre and flexibility. In Japan there is such a toy called Okiagari-koboshi. It is a traditional doll made from pap-mache designed so that its weight causes it to return to an upright position no matter how far it is knocked over. One of the most popular dolls from this tradition, is the Daruma doll, also

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known as dharma doll. Bodhidarma was the founder and first patriarch of Zen Buddhism and the round shape of the dolls reflects a legend about his life, symbolizing patience, perseverance and balance: characteristics important to keep in mind to keep on trying and practicing the breathing, vocal and movement exercises, and the benefit of these exercises.

The suffering from anxiety is part of many clients’ basic psychiatric problems. Sometimes the anxiety is very severe, and the client may even experience panic attacks in between. In the beginning of a treatment the client sometimes is not even conscious about suffering from anxiety, but in Psychodynamic Voice Therapy the anxiety among other things will appear in having difficulties in starting the warm up with body movement in the space. In those cases the client most often is afraid of getting more afraid (unconsciously), and can be very blocked from doing any movement at all. In these cases I instead start the warm up focusing on the breathing movement and a self-soothing touching circle movement, and then adding the breathing movement on top of this.

The client is asked to stretch out the left arm, and then take the right hand and place it on top of the left hand. Then with a gentle soothing touch the client is asked to make a movement starting on the top of the fingers, continuing to the shoulders where the right hand follows the curve of the left shoulder while turning the arm and continuing the soothing touching movement all the way down to the palms and fingers again and then to start the movement all over again.

I further specifically ask the client to follow this movement closely with the eyes, and breathe in while moving up the arm, and exhale moving down the arm. It is my clinical experience that this self-soothing movement exercise supports the client into a steady breathing pattern and in moments supports flow in the action as a whole. This touching behaviour can be described as a self-soothing sensory stimulation, which according to Hart (2006) will release the hormone oxytocin. Furthermore, the circle movement will support a steady breathing pattern decreasing the breathing rate as the movement is carried out. In the beginning this will hardly be noticeable to the client, but noticeable when studying the breathing duration.

According to Panksepp (1998, in Hart 2006) a panic attack can be activated when the respiratory system fails to maintain a steady rhythmic pattern. When breathing resumes, a rhythmic pattern the panic dissipates (Hart 2006). Thus, all the more reason to observe the duration of breathing and sounding.

The different movements may get the hands or the feet warm. In this case, the client is
open and allowing the benefits of the exercise to pass on to her/him. If the movement and the sensation which follows activate discomfort, the feet or hands will stay cold, and in this case the client is probably experiencing anxiety at some level, which prohibits the client to let go in the exercise. In the beginning of a treatment I have very seldom experienced the client being conscious of the feeling of anxiety. More likely the client notices nothing or a feeling of discomfort or an insecurity towards the body sensation. However for the music therapist it is important to take this information about the sensation of “coldness” into account and bend the exercise until it is comfortable for the client to carry out the exercise, and experience the body getting warm.

Singing teachers such as Brown (2004) describe the importance of paying attention to any bodily discomfort to help eliminate potentially unfavorable reactions in the phonating system. This approach is similar to Alexander Lowen’s (1975) understanding of bounded energy: emotions bounded in the tense parts of the body. In releasing body tension bounded emotional energy is released. The focus of the work may be different. Voice teachers focus on freeing the voice, and supporting the student in making the voice more alive and rich, whereas Lowen focuses on the psychological process of freeing the Self through actions. Combining the knowledge from both, voice work may be considered a method of self-development: a therapy where the result is a more free voice as well as a more free Self and an energized body and mind.

4.4.1 Supporting a more subtle sensation of grounding in practice
In order to support a more subtle sensation of grounding, the client is now asked to breathe through the nose while imagining smelling something pleasant, perhaps a favorite scent. This image will support the client to activate a reflex of deep inhalation. While exhaling, the client is asked to shake up and down in the knees very loosely in a quick vertical movement, and encouraged to allow oneself the uttering of the natural sound of a sigh (a descending glissando movement in the sound), an *Ah-h-sound*. The effect behind the sigh and the transition from breathing into sounding will be further explained in chapter 4.7.

In the present exercise the focus is on developing body awareness, and being able to notice body tension versus when the body is letting go of any unnecessary tension in the shoulders and arms, the whole body. When for example the unnecessary tension in the upper part of the body is being freed, the body weight will immediately support the client in getting a more subtle grounding body sensation. To keep a more subtle sensation of grounding when bringing this exercise to an end, it is important to keep a flexible and elastic sensation in the knees and not lock them.

As a final movement in the awakening of the body and in order not to stiffen up, but support the experience of being flexible, the client is asked to start a shaking horizontal movement in the hips and then the shoulders without moving the feet or locking the knees. The client is encouraged to make the movement as loosely as possible. When addressing the shoulders I often ask the client to imagine shaking something off they do not want placed there off, in order to shake the heavy burden off their body and mind. Just like when a dog shakes its fur when wet. In the beginning this movement can be difficult because the body is stiff and tensed up, but as the body awareness grows it gets easier.

4.5 The Vocal organ
As mentioned in the introduction to this chapter the purpose of this section is neither to present full anatomical details of the voice organ nor to present details of how the sound is produced, but rather to present those details needed to understand how body, mind, and muscle tension in different places in the body actually can affect the vocal quality. In the following I will therefore only give some basic descriptions of the voice organ and the vocal sound.

The vocal mechanism used to produce sound is a complex and extraordinary instrument that relies on the coordination of several
separate components that drives these functions: the lungs, diaphragm, larynx, vocal folds, pharynx, throat, mouth, tongue and nasal cavities (Sundberg 1987, Dayme 2009).

The fundamental power of the voice is generated through the voice by the lungs and the diaphragm. The airstream is concentrated and channeled by the trachea and bronchi and sent to the larynx. The larynx is often named as the voice box or the voice organ, because this is where the sound is produced. The larynx houses the vocal folds, which in response to the concentrated airstream pressure vibrate and set the air particles into motion and produce a sound wave.

The combination of the vocal folds and the space between the folds defines the glottis. When the vocal folds open and shut the glottis at an identical time interval, the sound wave is produced and a tone is generated. However, when a human being sings one single tone on a chosen vowel the vibrating vocal folds not only give rise to one single tone, but to a whole spectrum of tones. The lowest tone in the spectrum is called the fundamental frequency (F0) and is measured in hertz (Hz). This fundamental frequency is both equal to the vibrating frequency of the vocal folds and the frequency of the generated tone. This means that if you sing the note A4, which has a frequency of 440 Hz, the vocal folds vibrate, open and closing, 440 times per second. The fundamental frequency will most often be the pitch perceived by the ear, and is thus used to name the note.

The other tones are called overtones. All the tones have different frequencies and form a harmonic series. For example, if the fundamental frequency is f, the harmonics have frequencies f, 2f, 3f, 4f, and so forth. If the fundamental frequency (F0) is 25 Hz, the frequencies of the harmonics are 50 Hz, 75 Hz, 100 Hz, and so forth.

The spectrum of a tone can take many shapes, depending on the shape of the vocal tract 9). When singing a note very relaxed, the fundamental frequency will usually be the one tone with the most intensity in the spectrum, and the structure of the spectrum will decrease monocronically in intensity the higher the frequency gets in the spectrum (see figure 2) (Tongeren 2004, Sundberg 1987).

In overtone singing the fundamental frequen-

9) The vocal tract consists of the mouth, the laryngeal pharynx (the top of the throat), the oral pharynx (the back of the mouth), the post-nasal cavities (those of the nose), and the less influential trachea and bronchi, together with the sinuses of the head.
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Physiologically the maximum pitch range is determined by the length and shape of the singer’s vocal folds and this person’s ability to coordinate the vocal muscles with the rest of the body. The longer the vocal folds are, the lower is the pitch range of the voice. However the vocal fold length does not significantly depend on body length but rather on a significant correlation with the circumference of the neck. The vocal folds are shorter and thinner in women than in men, therefore their higher-pitched voices.

It is how relaxed/open or how tense/closed position the glottis has, that determines how breathy or creaky a voice appears. In between these two outer states is a state where the combination of airflow and glottal tension provides the maximum vibration of a tone/sound produced. A common term for this resonant mode of the vocal folds is modal. The more open the glottis is, the more breathy the sound will appear. If glottis however is closed and blocking for airstream, the voice will appear creaky. (Sundberg 1987)

4.5.1 Resonance

Another very essential aspect of the larynx is that the larynx is suspended freely in the throat (Sundberg 1987, Dayme 2009). Singing the notes “do, re, me” requires the delicate orchestration of almost 60 muscles. Most of the muscles are however used involuntarily and unconsciously (Perry 2007).

When producing a tone/sound the vocal tract are cavities acting as resonators and make the tone/sound produced vital, or put in another way, make the tone/sound live. All of the cavities are adjustable except for the trachea, bronchi, post-nasal cavity and sinuses of the head. The effectiveness of a given resonance of a sound is determined by the efficiency of the muscles involved in the preparation of the necessary adjustments as well as the position and shape of the lips, jaw, tongue, soft palate, and other sound producing organs (Sundberg 1987, Dayme 2009, Chapman 2006).

Therefore a rich resonant vocal expression depends on keeping the surrounding muscles as free from strain as possible, and having all components mentioned above synchronized and used properly. When this is possible, with no interfering tensions in the way, and a rich resonant sound is produced, it will give the singer an experience of ease and a carrying power regardless of intensity level.

4.5.2 Intensity

Through the use of this unique and comprehensive vocal mechanism, we can speak, shout, whisper, laugh, cry, moan, tone, hum and sing, express ourselves in a wide range of vocal intensities. The mechanisms for the control of vocal intensity, much as those of pitch control, involve muscular activity in combination with airflows and pressures. Additional changes of intensity result from variation in the size and shape of the vocal tract, which acts as a resonator of sound. Vocal intensity is usually reported in decibels (dB) of sound pressure level. Intensity is a degree of loudness (or volume) the perceptual correlate of intensity (Brown 1996). Therefore intensity is not only a physiological, acoustical and conceptual factor, it is also psychological and emotional, cf. Bruscia’s (1987) interpretation of musical parameters as psychological metaphors (e.g. “Intensity is a metaphor of the quality of the experience of the entity”, Wigram et al. 2002, pp 100) and qualities. Sound produced can be ample in volume either because of pure physical vitality, full resonance, or because of intense emotional involvement.

The pitch of the voice and its spectral composition (quality of the sound) may also affect its perceived loudness. In the sounding is a projection of the emotional through the physical, and this may in some situations give an impression of great intensity though the sound is not necessarily loud.

Increased pressures beneath the vocal folds, when released by the folds, produce a greater...
intensity, although the exact relationship varies for different vowels and voice qualities. Additionally, the range of intensities that the individual can produce in the falsetto register is much smaller than the intensity that can be produced in the modal register. A more detailed definition of register can be found in Table 1.

The distinction between a modal register and a falsetto register is when a male uses the lower frequencies (modal, the low register) to give sound, and uses the higher frequencies (falsetto, the high register) in an attempt to imitate the female voice. Therefore, intensity control by the vocal folds may be dependent on at least two factors, glottal resistance and the rate of airflow change at the moment of closure.

4.5.3 Voice quality

The specific qualities of their voices are what distinguishes Bob Dylan from Leonard Cohen when they speak or sing. The voice quality identifies the individual and sets him or her apart from everyone else. Even when singing the same vowel, at the same pitch there will be an individual difference in the voice quality.

In music, the term *quality* is called *timbre* (Brown 2004). Timbre relates to those aspects of the tone which can be varied without affecting the perceived pitch, duration or loudness of a tone. Timbre is the quality of a sound which is determined by the various overtones present in the sound, and their relative strengths (Howard 1997).

The human tract is able to produce a highly variable structure of overtones, called *formants*. The *quality of the voice source, vowel quality*, and *timbre* are constituted by the variation in muscles contraction and air pressure, which shape the vocal tract and determine the *formant frequencies*. The transmitted frequencies, which fit the resonator optimally, so to speak, are called the *resonance frequencies* or, if the resonator is the human vocal tract, *formant frequencies* (Sundberg 1987).

According to Sundberg (1989) the first four or five formants are the most important ones. The two lowest formants are the ones that determine what kind of vowel is vocalised, but all the formants are according to Sundberg (1989) of great significance to determine the voice timbre.

According to Lorentzen (2012), the perception and recognition of vowels is easy, and he
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Figure 3: Illustration by Werner Kaegi, which quantifies and simplifies the characteristics of the formants in the German pronunciation of vowels. (Lorentzen (2012, pp 57)

presents a figure by Werner Kaegi, which quantifies and simplifies the characteristics of the formants in the German pronunciation of vowels. Figure 3 shows a square building block by means of a maximum of two expressing vocal characteristics of a kind of formant scale. In German u consists mostly of low frequencies. The figure shows how the different vowels, from top to bottom, have more and more high frequencies present in the sound. It is my own and clinical experience that the low frequencies give a body sensation of resonating in the lower part of the body following how open the sound is, whereas high frequencies give a body sensation of resonating in upper parts of the body. A closer look at the figure reveals that the pronunciation of the German vowel i surprisingly also has a deep formant in addition to the high formants.

As mentioned above the spectrum of a tone can take many shapes, depending on the shape of the vocal tract. If the intensities in the higher overtones are stronger than the lower overtones the sound quality will be bright. And if the intensities in the lower overtones are stronger than the higher overtones the sound quality will appear as dark (Lorentzen 2012, pp 31).

Singing teachers sometimes characterise the quality of the voice in terms of placement. According to a listening test carried out by Vurma & Ross (2003) a sound quality may be experienced as either forward or backward. A sound quality placed forward turned out to correlate not only with higher frequencies of the first and second formants, but also with the higher frequency and level of the singer’s formant (Vurma & Ross 2003).

According to Juslin (2001) emotions are communicated both in an universally accessible manner and in an individual cultural manner. Furthermore Juslin (2001) describes how certain cue usages have a larger influence on certain emotions than others. For an emotional valence the combination of sound level and timbre (with attention towards the intensity / energy level of the high-frequencies in the spectrum) seems to be of special importance. This is however based on the fact that the emotions expressed are communicated through music, and not only by sounding one single tone. It is therefore my conclusion that it is the quality of the voice - the timbre, which contains the code for the emotions in play. Timbre and voice quality may be described with adjectives like warm, hard, clear, mellow, rich, tinny, hollow, thin, dry, dark, broken, light, full, metallic etc (Howard 1997). Furthermore the voice quality often makes us predict a psychological statement such as sadness, happy, passion, warmth, coldness, nervousness, fear or anger. Research has found that newborn infants are neurologically predisposed to identifying, and responding to, contours and rhythms of movements, gesture, and vocalizations in their mother’s gestures, vocal sounds, and facial expressions (Malloch and Trevarthen 2009), something Stern (2000, 2010) calls affective attunement.

Bunt & Pavlicevic (2001) writes:

In addition, they (the infants)”tune in” to subtle shifts in vocal timbre, tempo, and volume variations, and with their mothers negotiate and share a flexible musical pulse between them, constantly adapting their tempo, intensity, motion, shape, and contour of their sounds, movements, and gesture in order to “fit” and to communicate with one another. (Bunt & Pavlicevic, 2001, pp 193)
The constant change of the shape of the vocal tract also points out the possible effect muscular tension or lack of muscular tension in the body can have on the vocal quality as a whole. I have had several experiences, both personally as well as by observing others producing sound, reflecting how body tension affects the voice quality. As an example it can be an unconscious clench of the fist while sounding, which when released has an immediate audible effect on the voice quality. Summing up about the voice quality, it is all together constituted by the variation in muscle contraction and air pressure, and makes the voice high or low, loud or soft, very loose or rich, or pressed or harsh. The variation of muscle contraction and air pressure is closely connected to the emotional state and general state of being of the person sounding.

4.5.4 The pitch range of possible sound production

As described above, pitch range is first of all determined by physiological factors, such as gender, heredity and anatomy, but also affected by physical as well as psychological states of being, culture, habits and ways of living (“ways of life”).

Pitch range can be defined in different ways. Mostly a singing range is defined as a pitch range, which is artistically acceptable, where the pitches are balanced in quality for singing and produced at most ease and with most depth (Moses 1954, Dayme 2009). However, human beings are capable of expressing themselves within a much wider range of pitches.

Taking the natural sounds into consideration as well, the pitch range defined within music therapy will have to cover all possible sounds a human being can produce, not only being limited to a singing or speaking range. As mentioned in the literature review, Moses (1954) defined a potential range, which covers all the pitches possible for a person to emit from high to low, regardless of the nature or quality of the tone. The speaking range is in the deepest third of the potential range, and is defined by the range of the speech melody (prosody).

In my approach and understanding, and way of working with voice as a primary instrument within music therapy, the definition of the pitch range has to cover all the before mentioned possibilities of vocal expression. Therefore I lean towards Moses’ definition of a potential range, which allows the pitch range to be a dynamic phenomenon, which can be narrow or very wide. Using this definition it also allows the individual client a space, which both contain the possibility of creativity and natural sounds.

Normally the singing range is defined as covering two to two-and-a-half octaves, and every singer is said to have almost identical ranges (Dayme 2009). However, Alfred Wolfsohn’s study of the human voice and vocal training of different people, revealed other ways of approaching and understanding pitch range. According to Wolfsohn pitch range is something relative, which can be extended if you are able to imagine an extension of the pitch range either in the top or the bottom. This potential pitch range would be explored in connection with four different vocal qualities, the “violin”, “viola”, “cello” and “double bass”. In working with these different qualities Wolfsohn documented that it was possible to extend both potential and singing range by several octaves.

The vocal training I received from Mendelssohn and Ryan in the Wolfsohn and Roy Hart tradition, worked with the qualities mentioned above, but also with several other different vocal qualities. These vocal qualities emerged in the moment, in the appearance of cracks and holes in the glissando movement, or while working with and exploring the human voice’s capacity more generally. The Extended Vocal Training applied by Alfred Wolfsohn suggests that exploration of cracks, holes or broken sounds can reveal a new voice, a more free voice, or even the “shadow” of the voice. The “shadow” of the voice is explained as an authentic expression connected to hidden or bounded feelings of the person vocalising. (Newham 1997, Braggins 2005)
The “shadow” of the voice is connected to Carl Jung’s theory and understanding of the shadow representing unconscious potentials in the human being.

Within each vocal quality the pitch range of this quality was explored in a step-wise movement to extend the possibility of expression as a basic training principle. While working and staying with the intuitively chosen vocal quality that emerged in the moment, it often turned out that this quality, while working, opened up and transformed into a richer sound at the same time as it supported the student to connect to suppressed emotions. In many ways this way of training was following the principle of releasing bounded emotions and energy as mentioned in chapter 4.3.1.

There are artists, such as Sainkho Namtchylak (Dream of Death/appendix for chapter 4, USB-memorystick), and Roy Hart performing (Eight Songs for a Mad King/appendix for chapter 4, USB-memorystick), who in their artistic work cover a singing pitch range reaching up to eight octaves. Typical for them all is that they integrate the use of natural sounds in their artistic performance.

4.6 The awakening with sounding in clinical practice
In the following I will describe the awakening of sounding in clinical practice. The different exercises are presented following the structure of how I apply them in clinical practice within psychiatry. There are three mandatory categories of vocal exercises: the glissando movement, singing one single tone, and the sounding growing into a vocal improvisation. Within each category there will be many possible variations in how the exercise may be carried out. In this presentation I have only included the core exercises. In daily practice the applied exercise always follows the client’s basic conditions for working with body and voice in therapy. It is my experience that this is the basic reason why it has been possible for me to apply therapy related body and voice work widely among psychiatric patients; indoor as well as outdoor patients. The psychological understanding connected to the exercise is presented along with the description of the exercise.

4.6.1 The pitch range in clinical practice
When exploring the potential pitch range, Mendelsohn and Ryan used two key vocal exercises: the glissando movement and a step-wise movement up and down a tonal scale played on the piano. A glissando can be described as a sliding or stretching motion, where musical notes are not fixed. It could also be described as a physical basis of legato - a smooth, flowing motion upwards or downwards without breaks between the notes. Mendelsohn and Ryan introduced the glissando-movement in many shapes. It was
mandatory for vocal warm-ups, and in order to awake our playfulness towards different vocal expressions and qualities. As a natural part of sounding both upward and downward moving glissandi, we were asked to make a gentle shake with our bodies, either vertically or horizontally. This supported the bodies to loosen up and release body tension, as well as having an immediate effect on the vocal quality and the potential sounding range. Furthermore my vocal trainer during my music therapy training, Britta Kvist\(^1\), among other things made me aware of the natural sound and movement of the *sigh*. A sigh is often uttered spontaneously in relation to the arising of a positive emotion like *relief*, and has the character of a descending glissando movement. It is important to connect the sigh to this positive emotion, whereas a *groan*, which also has the character of a descending glissando, more likely stems from negative emotions like boredom, dismay, and dissatisfaction. Connected to the positive emotion the sigh, most likely spontaneously will sound with the widest possible aperture of the mouth and the tongue down; “Ah-h-h”.

In the awakening with sound in clinical practice the glissando movement is a mandatory vocal exercise, which is carried out variably. I always start with a glissando movement, which is very gentle, both according a starting giving sound as well as smoothing the larynx. It is a closed sound sounding a *Mm-m-sound*. If a person gives in to the exercise it will impart a tickling sensation in the lips and the mouth. The exercise will gradually expand from this starting point and grow into and end with an open sound: a movement from having a closed body sounding towards having an open body sounding.

My clinical experience has revealed how this process psychologically can be connected with a movement from a *private space* towards a *social space*, following Pedersen’s (2000, 2002, 2007) definition of the three communicative spaces described in chapter 4.4. The transition between a closed body sound and an open body sound is sharp and immediate no matter how gently the transition is planned.

Generally it is experienced as uncomfortable to begin sounding with a closed mouth, sounding within. This provides the person sounding with a sensation of safety. It is my clinical experience that the transition between a closed body sound and an open body sound supports the client in sensing the border between the private space and the social space more clearly. When a person opens the mouth and expresses a sound it awakes a sensation and an inner experience of intentionally reaching out to others. This action will in the therapy setting bring forth many different layers of possible experiences depending on the person sounding. Psychologically, some of these experiences may be connected with the phenomenon of manifesting oneself, revealing one’s Self more clearly to others, allowing oneself to take space, express needs or show and share feelings. It is my clinical experience that this sharp line between sounding within and sounding more openly can help the therapist to discover whether the client is suffering from social anxiety or not, or has a weak attachment to her/himself or experience of her/himself. This could also be described as ego-weak or selvusikre patients.

4.6.1.1 The *Mm-m-sound*

The very first thing the client is asked to do, is to keep the body in a gentle and comfortable shaking movement. This is done in order to prevent the body from tensing up unnecessarily as described earlier. The shaking movement is either a vertical movement or a horizontal movement as described in chapter 4.5.1. The next step is to give sound to a *Mm-m-sound* with the mouth closed, while imagining tasting something very delicious and yummy like a piece of chocolate. The first couple of times it is very small “tasteful” sounds, but then I ask the client to exaggerate.

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1) Britta Kvist is a classically educated singer. Her approach to vocal training was influenced by the Alexander-technique. By verbal and tactile suggestions she gently guided the student into the use of his or her muscles and a proper positioning of his or her body. The approach helped to feel and recognize sensations of proper positions of the body until correct habits in sitting, standing, and walking were developed and had become spontaneous and dynamic. Furthermore Kvist encouraged the students to explore the kinesthetic sensation of the vowels and the consonants. Kvist has trained music therapy students vocally for many years at Aalborg University, Denmark.
the “tasteful” sounds little by little. Stretching and prolonging the sound as well as the movement, and putting more intensity into the action of sounding with the purpose of supporting the sound to vibrate and resonate more clearly in the lips and mouth. In doing so, the glissando movement hardly noticeably grows and gets more and more musical in its performance and shape. It grows into wider and wider circles of glissandi, sliding from one pitch into another, up and down the musical scale. Gradually the vocal range becomes wider and wider reaching higher and lower pitches on the scale. The important part is to keep a relaxed feeling in the throat, but at the same time allowing the glissando to expand and grow, while “listening” to the body sensations and staying with the comfortable sensation of sounding, but also allowing oneself to explore the limitation in how wide the vocal range can be, and still be comfortable sounding.

4.6.1.2 Working with the contrast of tension and relaxation

Both within vocal training and music therapy the words “give in to” is used in a positive sense, and I also understand it as a necessary act in order to support the process of development. However, it is not always easy to “give in” to something or “let go” of something. Therefore a trick act can be beneficial. This trick act can be exaggerating the tension, focusing on making the sensorial experience of the contrast between tension and relaxation very clear.

The next step in the awakening of body and sound is therefore to ask the client to clench the fists, press the arms into the body, while tightening up the whole body and keeping the mouth very closed and tight, humming an ascending glissando movement all the way up until it disappears and then suddenly consciously letting go of all tension, opening the mouth and sounding a sigh, a descending glissando movement, on an Ah-h-h-sound, while shaking the body gently.

A sigh on the vowel “Ah-h-h”, can also be described as a long, audible exhalation. As described, premier natural sounds emanate from our human needs and have emotional triggers. Furthermore, they are a part of a whole pattern of responses involving the body and mind in a holistic way, where among other things the vocal fold closure and resonatory adjustments are made automatically (Chapman 2006). It is my clinical experience that the act of imagining and memorising the positive emotion of a sigh consciously may foster the effect of relief and relaxation. The coordination of the emotional motor system fostered by this activation will synchronize the muscles required for breathing to take in sufficient air for carrying out the task, as well as activate the muscle memory of the primal mechanisms, which affect the onset of the phonation that follows, and give access to the somatic abilities that foster stabilization (Chapman 2006, Ogden et al. 2006).

It is furthermore my clinical experience that the sigh offers the client a safe start in allowing her/himself to produce more open sounds, simply by starting with a very small sigh, that almost unnoticeably grows in length, ending by allowing a very exaggerated sigh to be sounded. In this case the sigh then has turned into a musical glissando movement sounded by the client from the very highest possible note to give sound, descending all the way down to the lowest possible note to give sound, and ending by only sounding the sound of air.

To continue supporting the grounding sensation the client is always asked to keep on shaking the body gently, either vertically (a light movement up and down in the knees) or horizontally (a light shake with the shoulders), as described earlier.

It is furthermore my clinical as well as personal experience that when a vocal expression is forced, because you think you want to, instead of following the inner flow of progress, there is a risk of passing your own limits, or neglecting your own basic needs in the moment. Passing this limitation may prohibit you from listening to yourself, your present state, and prohibit you from honoring yourself.
4.6.1.3 The open sounding glissando movement

After working with contrasts I continue working with open sounds only, and again a part of carrying out the open sounding glissando movement also has to do with asking the client to work with imageries.

Working with the open sounding glissando movement I ask the client to imagine that he / she is collecting something very heavy up from the floor with their hands. It can be a specific burden or even a body sensation, but always something the client would like to throw away if it was possible. I instruct the client to imagine that she/he lifts up this heavy burden from the floor with her/his hands. When she /he reaches the chest area, she/he tightly clinches the fists, as if squeezing the heavy burden into a compact consistency of a ball. This imaginative ball she/he moves up high over her/his head, while turning the fists. Then in preparing to throw the heavy burden far away the fists are gathered, almost touching each other bag to bag over the head, pulling all possible energy, and then intentionally throwing it away from her/him and her/his body, while opening the hands and letting go of the imagined ball of heavy burden, while emptying the lungs of air.

While still with the hands in the air I instruct the client to turn around her/his open hands as if she/he is going to receive something, which is good for her/him. Simultaneously she/he breathes in deeply, and starts a descending glissando movement from the highest possible note the client can give sound to, and then she/he slides all the way down sounding an /ah-h-h/ in a sighing style. At the same time she/he puts the body in a gentle shaking motion horizontally until she/ he has reached the lowest possible note she/he can give sound to until the point where there is no sound but the sound of breath. At this point the client’s whole torso is bent forward and downward as relaxed as possible, letting go of all the tensions in the lower part of the back, the shoulders and the neck (see Appendix for chapter 6, videoclip-VOIAS, USB-memorystick).

I usually repeat the exercise three or four times. The last time the client stands with the whole torso bent forward, and is then instructed to focus on her/his breathing, in each exhalation letting go of tension and giving in to the weight of the body, with knees slightly bent, and touching the ground with the fingers. This last part I have found is quite similar to an exercise developed by Alexander Lowen (1975), which he connects to fostering a grounding sensation.

It is my clinical experience that the use of a glissando movement is stimulating in many ways. The sliding and stretching motion supports a flexible attitude and opens up towards flow in the body and mind as a whole. Therefore it is always important to examine and observe how the glissando movement spontaneously is performed as a whole. The vocal expression of the glissando movement may take different expressions. It can be very different how fluently the client spontaneously performs the open sounding glissando movement. Sometimes it may even be performed spontaneously in a step-wise movement, and then it is important to examine if the client sticks to this expression or can be supported to express the glissando movement more fluently. I have often observed that the spontaneous expression goes well together with either the personality structure or the psychological state of the client. As an example, the reason for sounding the glissando movement step-wise can reflect the fact that the client for some reason is rigid and has a need for a clear structure. However it is important not to stop the analysis here, but instead continue being curious in the examination of what this specific vocal expression represents in connection with the individual sounding.

When working with clients suffering from depression it is my clinical experience that the pitch range very often is narrow and limited, just as the rest of the client’s movements. In such a case the ascending glissando movement and the vocal touch of the highest notes have a lifting and energy stimulating effect, whereas the descending glissando movement and the vocal touch with the deepest notes supports a grounding sensation. A client suffering from anxiety will also very often
have both a rigid expression of the glissando movement as well as a limited pitch range. In this case I have often experienced that the reason for this is the need for structure in order to establish a secure sensation within. The limited pitch range may in this case be an expression of narrowing the living space - a concept drawn from the understanding of Merleau-Ponty (1908 - 1961) in order to feel secure and safe.

There are also other things to be aware of in the work with the glissando movement. It is very seldom that a glissando movement is expressed without sudden jumps or cracks and holes in the scale. It is my experience that in clinical practice in psychiatry this goes for both vocally trained and not vocally trained clients. The sudden jumps, cracks and holes may be important for the music therapist to notice, and when the timing is right, important to study and explore closer. It is my general experience that these cracks, holes or sudden jumps may represent areas where emotions are bounded to a specific voice quality. So in clinical practice this is a hint for the music therapist about areas or vocal qualities, that could be worthwhile to examine or “touch” gently in various ways, when and if this is a therapeutically responsible action to take. In the clinical work with flow and in order to carry out the movement fluently, I therefore now and then instruct the client to follow the sliding tonal movement with all the possible awareness that can be focused and mobilised. This supports the client in being present in the moment of the action.

4.6.2 Pitch - The fundamental frequency
As mentioned above a tone generates a certain frequency, which determines the pitch. This frequency is both equal to the vibrating frequency of the vocal folds and the frequency of the generated tone. Pitch is the subjective measure of an acoustic frequency. The quality of the speaking voice is often an indication of the correct classification of a singing voice (Dayme 2009). A fifth from the lowest pitch within the singing range the middle frequency is located (Moses 1954, Eken 1998). The middle frequency is also named the “loose string”. This means the length, thickness and compression the throat muscles naturally exhibit in a relaxed state. The loose string depends on the natural size of the throat and vocal folds natural and innate length and thickness. A thicker and longer string has a deeper frequency and as such some voices are by nature more profound than others. Small throats with short vocal cords naturally have a higher frequency, and the person possesses a higher current speaking voice. (Eken 1998)

According to Sundberg (1987) this area is called the modal register (chest). This register is normally used for speaking and for most of the singing. Therefore the middle frequency represents a tone, which possibly may be the most easily produced, powerful and resonant tone for a human being to sing. Sometimes the sound of a grown up woman is unintentionally more girlish, or maybe without a sensation of weight. Sometimes there is a substantial difference in the quality of the speaking and singing voice. When this is observed I would define the voice as being disconnected from the core self. In other words it will represent a person out of balance.

4.6.2.1 Singing one single tone - the CoreTone - in clinical practice
From working with the awakening of body and sound, and focusing on flow, flexibility, stretching and moving, as well as being in contact with the potential pitch range available in the moment, a natural next step is to change focus towards one single tone and a centring sensation. The centring focus vocally is both about supporting a grounding sensation and more subtle sensation of body and Self.

There are many possible ways of working with only one single tone, but my clinical experience within psychiatry and general approach is founded on the understanding, that it is important to start where the client feels most vocally secure and at ease vocally.

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12) Singing one single tone should not be defined and understood on the general understanding of toning defined by Laurel Keyes (1973), yet it is related. In Psychodynamic Voice Therapy the work with the single tone should be a form in which spontaneous sound making with the voice is encouraged.
This is often complementary to feeling safe when giving sound. In Psychodynamic Voice Therapy the single tone is not a spontaneously chosen pitch, but a pitch found by the instruction I give the client. The client starts by placing the palms of her/his hands physically on top of each other, on top of the chest bone, and then drawing all the attention and awareness towards this place in the body. I furthermore instruct the client to imagine that behind the palms, behind the chest bone, there is an inner private space. The client is instructed to make contact to, listen to, and sound from this inner private space.

The next step is then to talk about something, the weather maybe, while both the client and I are listening carefully to the melody (prosody) of the speech. The practice in locating and choosing the pitch is then in between to sustain some of the vowels loooooooooonger in the ongoing speech. This will support the client to end up singing the middle frequency, which the speech circles around; a CoreTone as I call it (see Appendix for chapter 6, videoclip-VOIAS, USB-memo-rystick). The CoreTone is not a fixed pitch, but will change in relation to mood, energy or state of being. In other words, the CoreTone is a dynamic phenomenon.

When the CoreTone is identified, the client is instructed to stay with this specific pitch and produce as well as sustain an Ah-h-sound. A vowel pronounced as in the word “farther” or “car”, at this comfortable pitch and loudness level. I ask the client to sound this tone over and over again, until flow can be observed in the duration of breathing and sounding following the basic principles of flow, presentness and embodiment mentioned in chapter 4.3.1. Having the hands placed on the chest bone while sounding gives the client an opportunity to be in physical contact with the vibration and the resonance that the sounding of the single tone causes.

I have chosen this vowel first of all because the Ah-h-sound is the widest possible aperture of the mouth and with the tongue down. Furthermore it is my intuitive experience that the Ah-h-sound of all the different vowels is the vowel which is sensed most clearly in the heart region on top of the chestbone.

When the client has found the CoreTone I immediately tune in and match the sound quality of the client and sing in unison. The sound of the music therapist and the sound of the client meet in a sounding space. The encounter occurs when the therapist matches the shape, form, quality, dynamics and richness of the sound following the principle of interpersonal communion described earlier in chapter 4.1.1. In the encounter in the sounding space I support the sound to grow beneficial in different ways, and this work is closely related to the listening perspectives that will be further described later in chapter 4.8.

The sounding process has the following structure. The client and the therapist are sounding together, singing in unison. Then comes a passage where the sounding has the character of a dialogue. The client is asked to sing alone and the therapist responds by answering back with a matched sound. Then the exercise returns and ends by both sounding together, singing in unison. This is a process I have named Dyadic CoreTone Singing.

Singing in unison is clearly a supportive stage, where contact is made to a private space within, whereas the passage having character of a dialogue clearly is connected to the social space, following Pedersen’s (2000, 2002, 2007) definition and understanding of the three imaginary spaces.

In my understanding communication occurs during the whole Dyadic CoreTone Singing-exercise. The “dyadic” exchange between the therapist and the client has content and purpose all the way through, and is largely centred on the expression and sharing of the experience of inner states; - an affective attunement (Stern 1985, 2000, 2010) that corresponds with Wigram’s definition of matching. Motivated expression leads to an intersubjective sharing of inner states, in which expressive gestures articulate what Stern called vitality affects (the inner sensations of being alive in a body) (Stern 1985, 2000, 2010).
In allowing the client to choose the pitch herself, it does not depend on the scale on the piano or what I choose. The pitch of the CoreTone comes from a core centre feeling within the client - a private space. The name CoreTone is related to the psychological understanding of what the effect of sounding the CoreTone brings and represents. I connect Daniel Stern’s (2000) theory and definition of the Core Self to the sounding and self-experience of the CoreTone. Stern (2000) describes how the child builds an implicit and procedural knowledge of his/her ability to act, to have feelings, to have a coherent sense of the body and a sense of time. These sensations reemerge in the therapeutic situation, where clients, for example, can feel unable to act, have difficulty recognizing emotions, experience a “dissolving” of the body’s boundaries or lose their sense of time. In other words, their difficulties lie in the domain of the sense of the self that Stern calls “the core self” and “the subjective self”.

In asking the client to find and choose the pitch themselves it is my understanding and experience that I support the client’s awareness towards her/him Self and nourish the awakening of listening and sounding her/him Self and share this with the music therapist. It is my clinical experience that when the client senses how the sound vibrates and resonates in the body, and when he or she is in physical contact with these vibrations with the hands, it supports a grounding, and a more subtle sensation of body and Self, as well as the ability of being more fully present in the moment. The transition form not being fully present and not sensing the tone vibrate in the chest to being fully present and sensing the tone vibrate very clearly in the chest often makes the client stop the exercise and spontaneously describe the sensation and experience in words. It is therefore my clinical experience that the result and experience of the work is very intense and clear.

Over the years it has also proven to be a very practical way of being in contact with oneself. Furthermore the client’s listening to and following the sound of her/his own voice closely with all the attention and awareness possible for the client to focus, supports the client to focus, concentrate and bring her/his attention closer to her/himself, and this makes it possible to stay with her/him Self and thus support a greater self-awareness. It is in this work that I recognise the following quotation from Ogden to be proven right.

“Generally speaking, somatic resources that involve awareness and movement of the core of the body (centering, grounding, breath, alignment) provide a sense of internal physical and psychological stability and therefore support autoregulation.”

(Ogden 2006, p. 222)

A more subtle sensation of Self is provided for the client in the sounding and the sensorial experience of the CoreTone. This is put into words in the dialogue between the client and therapist about the work. In sounding the CoreTone the therapeutic process is about allowing your voice to be present, audible, and feeling comfortable in allowing your tone to sound freely. In repeating the CoreTone over and over the sound will steadily open itself to a more rich and vibrant sound. The process of sounding the CoreTone will furthermore support the client in getting in contact with their Self, different feelings and inner experiences, which then in the therapy setting can be worded, shared and contained. In allowing the CoreTone to vibrate fully lies the acceptance of one’s Self and what is present of feelings and inner experiences.

The next step is the CoreTone exercise growing into a variation of this exercise: the CoreToneVolume exercise. The CoreToneVolume exercise supports a more subtle acceptance of one’s Self in the manifestation of yourself, in showing your Self more clearly to others, and allowing yourself to take space, as well as expressing needs or showing and sharing feelings. In the CoreToneVolume exercise the client is guided to allow the
CoreTone to grow broadly in texture. Having built up a secure sensation of the CoreTone and an experience of the CoreTone representing the private space, a home base, the client is now instructed to think about the hand movements as connected to the loudness level of the CoreTone. The more distance to the chest the louder the CoreTone sounds. The sounding start by having both hands placed on the chest bone and starting as quietly as possible to reach a loudness level which feels comfortable, and then turning into a deccrescendo of the CoreTone ending with silence. All in one breath.

In voice science the term fluctuation is sometimes used to describe the disturbances of how consistent and steady the voice is when sounding a tone. In order to describe this, various descriptive terms are used, such as jitter, shimmer and vibrato. Jitter concerns small unsteady changes in the fundamental frequency happening in short-term within a single cycle of vibration. Shimmer is about small unsteady changes in the loudness level. Vibrato is however both a natural phenomenon and a cultured and artistic phenomenon. In Psychodynamic Voice Therapy the vibrato reflects the emotions and a person’s state of being. A human voice can tremble with rage or fear, bubble with laughter, or grow unsteady when depicting age or a client’s state of being as a whole, psychologically or somatically out of balance. According to Reid (1999) the vibrato indicates a healthy functioning vocal technique and therefore should be viewed as a sensitive barometer of the emotions. However it is also my clinical experience that fluctuation may be viewed as a sensitive barometer of a client’s state of being both psychologically and physiologically.

Within music therapy this is a more relevant understanding of vibrato and fluctuation, and this understanding is supported through my many years of self-experience as well as clinical experience. I have often experienced the human sound as unstable, fragmented, and even strangely mechanic, motor-like, and then to bloom into a pure and steady sound, at the same time as it blooms in richness. In the acceptance and allowance of the sound quality to be, a living space (Merleau-Ponty 2002) is provided, and the client is living the CoreTone in the here and now, having it vibrate, tremble or be very unstable while connecting to a subjective experience as it is lived pre-theoretically and pre-reflectively (Stern 2010).

This transformation cannot always be described in words by the client, and it is not always necessary to describe in words what has happened. The sensorial experience is however very clear, and it will often be connected to an experience of freeing something, and sensing a lightness and vitality in body and mind. Basically the whole process reflects an acceptance of one Self.

Another way of getting closer to a more subtle sensation of the Self is by self-observance of the sound of the CoreTone and the body, in a way making the sound of the voice an object for self-observance, and allowing the person to listen curiously to the sound and listen to the body. This will be described in detail in the chapter 4.8 about listening perspectives. However, my years of experience with this vocal exercise has proven this to me: In one single tone a whole life story can be told and heard. It is quite fascinating. In other settings like teaching at the music therapy programme or giving an intensive workshop, I have often had students or participants under close observance one by one, while they worked together two and two and carried out the Dyadic CoreTone-exercise. Meanwhile the rest of the group was listening intensively to the sound of the CoreTone of the person sounding, and without thinking drawing whatever came to their mind. The results of this listening process have in many situations been stunning, because the drawings or associative words were telling stories which matched the life-story of the person sounding the CoreTone.

4.6.3 The sounding growing into a Vocal improvisation in clinical practice

The work with the dyadic CoreTone singing will eventually have provided a sensation of being grounded and centred, and therefore fostered an experience of being in contact with a personal and psychological “platform” or foundation within. As mentioned before I
connect this inner private “platform” with Pedersen’s (2007) definition of a “private space”. The conditions for daring to explore possibilities or opportunities of the living space (Merleau-Ponty 2002) in the sounding space (Kenny 2006), as well as the internal experiences, thoughts and feelings, are primarily based on a solid contact to the “private space”. There are an endless amount of ways in which a vocal improvisation can emerge. In the following I will describe a few different techniques.

A very structured and safe way is to allow the CoreTone to grow in both volume and power of resonance, and to stay with this experience and sensation, and then carry and keep this body sensation in the work of widening the space of this sounding quality in a step-wise movement up and down the tonal scale.

Another more explorative way is to allow a vocal improvisation to emerge from sounding the CoreTone. It can be done step by step, allowing more tones to be added in the sounding, and little by little a melody or a rhythmic pattern will emerge. The next step is then to allow this melody or rhythmic pattern to expand its living space. In doing that the client is allowing her / himself to explore the possibilities and basic conditions (Kenny 1989) of a living space. The melody or rhythmic pattern is considered a way of expressing ourselves and interacting in the world, and in the clinical improvisation we can actualise ourselves by a creative force (Kenny 1989).

The improvisation may also emerge from the quality of the movement when adding a sound expressing the movement, or while exploring the vocal quality. In the playing and interacting with the vocal quality, images often emerge and grow into narratives created in the moment and lived in the creation of an improvisation.

4.7 Listening perspectives in Psychodynamic Voice Therapy

The client and the therapist meet in an inter-subjective space, the sounding space. In Psychodynamic Voice Therapy this field follows Kenny’s (1998, 2006) definition of a musical space.13) To give sound is both something subjective and objective. Subjective, because it reflects the inner life, feelings, thoughts and experience of the person giving sound. In other words the sounding space is a space of existence - being - living. Objective, because the sound created by the human being is also an external object. The sounding space is a resource pool to the client and the therapist (Kenny 2006).

13) Kenny (1989, 2006) defines the musical space as a field of existence explored and shared by the client and the therapist through sound. In the meeting between the client and the therapist a self-motivated action is created and takes form in the intention to engage, grow, and expand into the field of play, as well as develop wholeness.

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To see a World in a Grain of Sand
and a Heaven in a Wild Flower
Hold Infinity in the palm of your hand
And Eternity in an hour

William Blake
Auguries of Innocence, 1803
The listening principle gives access to this resource pool of sound in many different ways. It can be a key to patterns, dynamics, moods, feelings, or images. The listening principle is about a process of meeting, listening to and using the resource pool of sound with respect and wisdom. The therapist is a facilitator to the client in this process. Basically I therefore consider listening a holistic phenomenon representing both objective and subjective elements. The listening discipline is shared subjectivity and very different from a standard verbal psychological setting, because it is also non-verbal and deals with the primary mode of engagement, sound and music (Kenny 2006).

Listening is therefore very essential in music therapy. Focusing on Psychodynamic Voice Therapy the human voice becomes a non-verbal tool for orientation and information towards the client as well as towards oneself. Awareness towards the listening will support communication of important observations. I prefer to call the overall awareness towards sensory stimuli in Psychodynamic Voice Therapy listening, and therefore I will only very briefly describe the impact of hearing. An ongoing curiosity towards listening and the observations one can “hear” will reflect one’s own being and support the psychological interpretations, and at the same time clarify how and what musical events supported this therapeutic process.

First I will describe the ontological and epistemological background of the listening perspectives underpinning Psychodynamic Voice Therapy. Then the listening perspectives related to the vocal exercises in clinical practice will be described.

4.7.1 Hearing

Hearing is one part of the listening perspectives. It is about sensing sounds. Hearing is all about vibration and can be described as the physiological process of registering sound waves as they hit the eardrum. Hearing is among the first senses developed and functional even prior to birth. There is no control over what is heard, and the sounds have no meaning until we give them their meaning in context. However, hearing is an auditory sensory stimuli and therefore not the only responsible factor for what the human being experiences, interprets, and concludes from the processing of the sensory stimuli of a sound (Dayme 2009, Bonde 2009).

There are however different important fundamental aspects of the act of perceiving. The first one is the ability to hear with no impairment of the anatomical structures of the hearing mechanism. The second is how information of the actual stimulation of the auditory sensory system is passed on to the brain. This concerns the neuro-physiological aspects. In addition to these factors are also the role of emotion, intellect and education in the perceptual processes. (Dayme 2009)

A human being giving sound can both be perceived by the human ear and sensed in the body as described earlier in chapter 4.2, “The human body and voice as instrument and media”. For human beings, hearing is normally limited to frequencies between about 20 Hz and 20.000 Hz, although these limits are not definite. The sound waves are audible acoustic waves that carry sound and are caught by the ear, identified and defined in sound and location. (Howard 2006)

In chapter 4.2.1 and 4.3 the auditory neurological process of the sensory system and the auditory system were described and I will therefore only here clarify the ear as the sensory organ that recognizes sound. However, it is the brain and the central nervous system that “hears” the sound. The ear changes sound pressure waves from the outside world into a signal of nerve impulses that are sent to the brain.

The field of psychoacoustics springs from the study and exploration of hearing and perception of music. The psychoacoustic principle for understanding perception of music and other sounds are terms like pitch, loudness, timbre and duration. (Howard 2006, Bonde 2009)

Pitch is related to frequency, but they are not equivalent. Frequency is the scientific measure of pitch, and while frequency is objective, pitch is a subjective evaluation. The actual fundamental frequency can be precisely determined through objective measurements, whereas the fundamental
frequency may differ from the perceived pitch (Lorentzen 2012). As mentioned in chapter 4.6 the different intensities in the harmonic series may sometimes cause difficulty in the subjective determination of the pitch (Colton et al. 2006).

### 4.7.2 Listening

Listening, on the other hand, is an active process that constructs meaning from both verbal and non-verbal messages. It involves a substantial amount of interpretation by the listener to reconstruct a message that is more or less identical with the one that the speaker intended to send. As mentioned before we have been hearing since birth, and even before birth in the stomach of our mothers, but not listening. Listening is a skill that is acquired over a lifetime and is a part of our overall perception in order to organize, identify and interpret the sensory stimuli. Listening requires significant effort, mental skills, practice and attention, and like any skill, the more you practice the better you get at it. To fully understand the impact of this, a parallel can be drawn to deaf children or adults, who after receiving a cochlear implant (and thus being able to hear) have to practice and build up the discipline of listening.

The principle of **listening** is therefore much more than **hearing**. As just mentioned in general listening is an active process and a communication technique that requires the listener to understand, interpret, and evaluate what she/he hears. The ability to listen actively can improve personal relationships and thus reduce conflicts, strengthen cooperation, and foster understanding. However, listening is also a pathway to change.

As mentioned above, listening is an important and essential discipline in order to meet the client in the **musical space** (Kenny 1989, 2006) in a music therapeutic setting, and it requires an empathic, resonant and respectful attitude. The music therapist will have to trust that the client will experience being connected, and is able to hear what she/he needs to hear at the actual moment in their life and ongoing process towards wholeness. Therefore I am also of the opinion that the act of listening implies a responsibility of the music therapist to allow and trust that the individual client will follow his/her natural path for personal development and growth. The active listening of the music therapist involves making decisions and being constantly creative, and therefore I would like to add that the listening discipline requires vigilance, patience, a maximum awareness and sensitivity, a critical listening attitude to all the information, and not least humility.

The listening principle in music therapy moves us on every level and allows us to get in contact with images, patterns, moods, textures, feelings, and processes which will be described in more detail in the following. The therapist is highly active and should be aware and ask her/himself who and what he or she represents in the intersubjective space, the sounding space.

Kenny writes about listening:

> “I do not always understand what is said. Yet there is a presence that holds me in aesthetic arrest. I do not move. I attempt a deep listening. I sense qualities. I perceive the many lines on a face. I open my heart to voice, to tone. I watch arms move and laughter flash. I pay attention to regalia.”
> 
> Kenny (2006, pp 162)

This quotation reflects the resonant stance of the listening principle. Such a deep listening will inevitably move all aspects of our lives; cognitive, body, emotional, cultural and social. The meeting between the patient and the therapist in the sounding space can therefore not only be seen in terms of transference and counter-transference (Stern 2010). The listening is about being very empathetic, open, present, and resonant with the client’s basic feeling in an acceptable way for the client (Pedersen 2006). Stern (2010, pp 145) describes how the perceptive process is ongoing, and the mirror neuron system is called into play and directed to the lit-up action of a lit-up person, creating a virtual

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14) A **mirror neuron** is a neuron that is activated both through actions and observation. The neuron “mirrors” the movement of the other, as where the listener or observer acting her- or himself. The mirror neurons are the neural basis of the human capacity for emotions such as empathy. (Bråten 2007)
enactment of the other’s action, an imagined movement. Referring to mirror neurons, Stern (2010) makes the point that when people move in mutual attunement and synchrony with each other, they participate in an aspect of the other’s experience. Empathy encompasses all these processes - object choice, sympathy, empathy, and enactment. This is an ongoing process that has an impact and shapes one another. The difficult part is to discover when responses involve empathic processes over-facilitated and when empathic actions are taken.

The dynamic features, when expressing your self, like the prosody of the speech consisting of melody, stress, volume modulation, vocal tension, creates the forms of vitality (Stern 2010). As mentioned in chapter 4.2.3, the forms of vitality are possible and more clearly observed in Psychodynamic Voice Therapy when expressing your Self spontaneously in simple interventions as presented here or when creating a vocal improvisation or short melody in the “here and now”.

What differs Psychodynamic Voice Therapy from most other psychotherapeutic settings is the fact that movements in the understanding of vitality forms in privileged in clinically observations or balanced in privileged with verbalization. It is my experience that vitality forms in general are left out or peripheral in the awareness and report of most clinical observations of verbal psychotherapies. Instead there is given privileg to the content of the verbalization.

In a psychotherapeutic situation the observation of the forms of vitality generally will offer a different path for the client’s personal delopment or treatment, than when the verbalization is privileged. This path might go further or even faster, and provide contact with the defense mechanisms, and facilitate the exploration of the conflictual content. The observation or listening for the forms of vitality offers more perspective to “meaning” whereas language and symbolization usually are the only, or major, creators of meaning, and offer different ports of entry into the mind. (Stern 2010)

By studying the forms of vitality the focus is on how the client expresses him- or herself in the “here and now”. This is exactly what the listening perspectives is a study about. Later in this section it will be elaborated how and in what way it is possible to listen for and observe some of the forms of vitality.

I can only agree with Stern (2010, pp 119) why not address the vitality forms more directly in clinical theory and practice. These are experienced all the time by therapists and patients, in them selves or in the other, consciously or non-consciously. The purpose of Psychodynamic voice therapy is to train the listening skills. Learn what to listen for, and train the possibility of becoming aware of small “signals”. Both for the client and the therapist. To the client the forms of vitality also functions as guidelines for keeping healthy, respecting yourself, and stand by your self. And to the therapist the forms of vitality.

This brings forward the dilemma of subjectivity in the music therapist’s way of being present. Every human being has an impact on another being, and therefore transference as a phenomenon is inevitable. I agree with Kenny (2006) that we tend to think of inter-subjectivity as a problem. Constructs like transference and counter transference then become cognitive structures guiding the need to make sense out of the experience evolving in the present interplay/interaction with the client. Too much consciousness towards the theoretical structures in the actual clinical situation may prohibit the music therapist from being present her/himself. (Kenny 2006)

My own clinical experience is that I will never be able to prepare myself fully/completely for the meeting with the client. But what I can prepare myself for, is to know how to be present, centred, and show authentic interest while listening carefully, and not allowing theoretical ideas to come in the way. This action will support the client in the experience of being met. It is a fact that the most transforming and curative elements in psychotherapy are the experience of the therapeutic relationship (Stern 2010).
Clinical Approach as part of the research method

According to Pedersen (2006) a state of disciplined subjectivity means taking the following into consideration:

"- actually perceive the vibrations (non-verbal sensations) of which she is a part.
- take responsibility for not being overwhelmed by the vibrations / emotions / experiences of which she is a part.
- be aware of and take responsibility for the transitional space of which she is a resonant part.
- be committed to continuously finding ways of understanding the processes that take place in the transitional space of which she is a part."

(Pedersen 2006, pp 95)

Additionally Pedersen (1997, 2000, 2006, 2007) has developed and described a method of listening perspectives and listening attitudes, which forms an important element in the music therapist’s practice. Pedersen’s definition and method aims at filling out the gap between a) intuitive experiences and sensations of being with a client, and b) the task of translating these experiences into the psychoanalytic terms of transference and counter transference. Pedersen’s method of listening perspectives and listening attitudes can be considered a guidance of how to make sense out of the experience evolving in the present interplay/interaction with the client.

As mentioned before the listening principle moves on every level, and therefore it is important to notify that in clinical practice several layers of attention are actively in play at the same time. Pedersen (2006, 2007) defines this as an allocentric way of listening. In order to be in allocentric state of listening the therapist must be extra sensitive and attentively “being present” in the situation, and able to oscillate in and out of the shared field. Pedersen (2006) defines the allocentric attitude as follows:

“Here the therapist listens with her full awareness directed towards the patient and resonates deliberately and authentically with the patient’s physical presence in the room (the foreground). Gradually she then makes it possible for small “sparks” of emotion from the patient’s split reality (the background) to become a part of their relationship (both with-in the music and out-side of it).”

(Pedersen 2006, pp 124)

Pedersen expands this technique when describing how the listening experience is about listening to two channels simultaneously and gaining information about the possibilities of interventions intuitively, as if listening to a third channel in herself. I find that this embodied way of listening is similar to Kenny, Langenberg and Loewy’s (2005) definition of a psychoanalytical based method, the resonator function:

“The resonator function” is the personal instrument of relating and understanding by which the therapist resonates to the latent content of the music, allowing this content to become conscious and inspire clinical interventions.

(Kenny, Langenberg, Loewy 2005, pp 343)
In order to be able to listen so deeply, and not unconsciously start a domino effect of counter transference, it is my opinion that the therapist has to be present in her/his inner private space. It is a very embodied way of listening where the presence of the music therapist is characterized by both being and living in the musical space, and being able to share this moment of existence with the client. This implies being embodied and centred, while directing one’s attention towards the sounding space.

Pedersen suggests listening to three imaginary “being present” - and communication “spaces”: the private, the social and the soloist’s space. This I consider an approach of how to be present while listening and interacting.

However when describing, communicating and documenting what occurs in the therapeutic session and in therapy over time within the sounding space I find it necessary to be more specific about what to listen for. So in the following the approach and direction of listening will be described specifically in relation to clinical practice in Psychodynamic Voice Therapy.

4.8 Listening related to clinical practice in Psychodynamic Voice Therapy

In order to meet the client in the sounding and provide a sounding space, which can expand into a “field of play”, the therapist will attempt to equalise his/her aesthetic conditions through tuning in and matching (see definition in chapter 4.7.2.1) the client’s vocal sound. This serves to educate the therapist about the aesthetic of the client, to learn, to grow, and to expand while listening to the creative impulse moving from within the client. (Kenny 1989, 2006)

To tune in also covers to attune to one another’s emotive expressions and gesture and sound producing movements. In tuning in the music therapist listens to the creative impulse and invites the client into a contained space, created in the relationship between the therapist and the client, while providing a safe space for growth and change from within.

I will start by presenting those listening perspectives, which I am currently aware of having applied in my clinical approach in order to tune in and meet the client, as well as to orient myself towards the client’s state of being and therapeutic process. The section will end by summing up all the vocal parameters extracted from my clinical approach as a whole.

4.8.1 Tuning in and listening for the meeting between two sounds

When the music therapist tunes in, matching and meeting the client’s sound quality in the sounding space, the vibration and the resonance of the client’s sound is facilitated and supported to grow beneficially in different ways, following the principle of interpersonal communion described earlier in chapter 4.1.1.

In order to do so the music therapist will have to know how to make her/his sound resonant, as well as awaken a sensitivity towards listening for a certain ring and detect the resonance reflecting that a strong acoustic reflection is occurring in the sounding space (harmonics higher rings).

When a person sings alone and a second then joins in on the same pitch and sings in unison with another person, the first will notice how singing feels easier, because the sound from the client and therapist enhance one another. This sensation is clearly experienced when the client and the therapist sing one single tone as in the exercise of the CoreTone. Often this phenomenon is described by the client as the sensation of how a sudden easiness in sounding occurs. Tongeren (2004) describes how intersubjectivity is reflected in the sounding space, as well as the intensity of the meeting in the following way:

“This is first of all so because of the fundamental frequency, which usually carries most of the sound energy. But if these are perfectly attuned, then so are the harmonics above them. This synthesis of two tones on a higher plane reinforces the convergence of the two voices, which now fuses on many levels and not just on the ground level. … … The effect can be so strong
In a Psychodynamic Voice Therapy setting this is a part of how the music therapist supports the client in the process of self-healing.

4.8.2 Listening to a spatial body sensation and the quality of the sound

While tuning in and matching the client’s sound, I listen to the process of both the client’s and my own sound. This is an ongoing process, and I constantly shift between the two stances. On one level I listen to how my body reflexively adjusts itself to the client’s sound quality. On another level I listen for and place the sensation of where in my body this sound is resonating. This process provides me with a kinaesthetic information of my felt inner-body sensation and supports the information I visually observe of the client’s body posture. I often invite the client to share the subjective experiences and study the muscular as well as the bodily reactions, in order to support a growing body-awareness as well as a growing consciousness of the related emotional code. I furthermore often ask the client where they experience the tone to resonating and being placed in the body.

All in all this is a very embodied and primary stage of listening based on a primary mode of engagement. This action could also as a whole be described as a sounding gestalt. The definition of a gestalt is that it is an organized whole perceived as more than the sum of its parts. I have found that the kinesthetic sensation, combined with how the sound quality could be described with adjectives or musical terms, follows a certain spatial body sensation either horizontal or vertical. As an example, a light breathy and “girlish” sound high in pitch will hardly be experienced in the body, and if sensed it will be sensed in the head. Another example is how a bright, compressed and sharp sound, giving a sensation of intentionally moving forward, will be experienced in the front part of the chest, and very often reflexively open the front part of the whole body.

Wrapping up this sensation it comes up with a method in listening to a spatial body sensation, that either can be described from a horizontal or vertical point of view. A vertical spatial body sensation can either be placed in the head, the throat or the body, while a horizontal spatial body sensation can be placed in the front, the middle or the back of the body.

4.8.2.1 The horizontal body sensation

When listening to the horizontal body sensation a sound placed in the front of the body may be described as moving forwards, being an outward direction, and experienced as more bright and sharp in the sound quality. A sound quality placed in the back of the body may be described as moving backwards, being an inward direction, and experienced as more dark and round in the sound quality. If the sound is placed in the middle of the body the sound is balanced between the quality of the front and the back, and may be experienced as a combination of a dark and bright sound quality.

I have furthermore found that the horizontal spatial body sensation goes well together with Russell’s (1980) circumplex model. This model to some degree may guide the psychological interpretation of the emotions projected in the sound quality unconsciously by the client. However it is important to keep in mind that the interpretation can never be absolute.

Juslin (2001) utilized a version of the circumplex model where he presented a summary of the code usage established in studies of performers’ communication of emotion in music (see figure 4). In his version he focuses on the five emotions most studied (happiness, sadness, anger, fear and love/tenderness).

The circumplex model is devided into four sections. Emotions like happy, fear and anger are placed above the line connected to high activity. The emotions tenderness and sadness are placed below the line connected with low activity. Adjectives describing vocal expressed tenderness and sadness will often be round, dark, inwards, and breathy. Adjectives describing vocal expressed happiness, fear and anger will often be bright, outwards, sharp,
Chapter 4

Positive valence

- slow mean tempo (Ga96)
- slow tone attacks (Ga96)
- slow sound level (Ga96)
- small sound level variability (Ga96)
- legato articulation (Ga96)
- soft timbre (Ga96)
- large timing variations (Ga96)
- accents on stable notes (L99)
- soft duration contrasts (Ga96)
- final ritardando (Ga96)

- TENDERNESS

Middle

- fast mean tempo (Ga95)
- small tempo variability (Ju99)
- staccato articulation (Ju99)
- high sound level (Ju00)
- little sound level variability (Ju99)
- bright timbre (Ga96)
- fast tone attacks (Ko76)
- small timing variations (Ju/La00)
- sharp duration contrasts (Ga96)
- rising microintonation (Ra96)

- HAPPINESS

High activity

- fast mean tempo (Ju00)
- sharp timbre (Ju00)
- spectral noise (Ga96)
- fast mean tempo (Ju97a)
- small tempo variability (Ju99)
- staccato articulation (Ju99)
- abrupt tone attacks (Ko76)
- sharp duration contrasts (Ga96)
- accents on unstable notes (li99)
- large vibrato extent (Ob96b)
- no ritardando (Ga96)

- ANGER

Negative valence

- slow mean tempo (Ga95)
- legato articulation (Ju97a)
- small articulation variability (Ju99)
- slow sound level (Ju00)
- dull timbre (Ju00)
- large timing variations (Ga96)
- soft duration contrasts (Ga96)
- slow tone attacks (Ko76)
- flat microintonation (Ba97)
- slowvibrato (Ko00)
- final ritardando (Ga96)

- SADNESS

Directions

- Forwards
- Middle
- Backwards

Locations

- Upper head
- Lower head
- Throat
- Chest
- Stomach
- Pelvis
- Forward
- Middle
- Backward
and metallic. As such it goes well together with the definition of the horizontal body sensation.

In figure 4 references based on musical parameters are made to results from research studies connecting each emotion either to high or low activity. The circumplex model also shows how some emotions have positive valence and other negative valence. Happiness and tenderness have positive valence and sadness, fear and anger have negative valence.

Juslin (2001) suggests that certain cues may have a larger influence on certain emotion dimensions that others. For the activity level cues like tempo, sound level and articulation seem to be especially important. For emotional valence the important cues seems to be the amount of high-frequency energy in the spectrum - timbre combined with sound level.

This goes well together with my working experience, approach and understanding of Psychodynamic Voice Therapy. In figure 4 the difference between for example sadness and tenderness is defined by a timbre categorised as either dull or soft. However, a soft sound does not necessarily appear less alive but a sad sound may appear less alive cause to the overtones in the spectrum.

4.8.2.2 The vertical body sensation

Listening to the vertical body sensation concerns the sensation of where in the body the sound expresses resonates, and how rich it is.

During my vocal training with both Mendelssohn, Ryan (Centre Artistique Roy Hart, France) and Britta Kvist I worked with the subjectively experienced body sensation of the resonance related to specific vowels. As mentioned in chapter 4.6.2 the four different vocal qualities were the “violin”, “viola”, “cello” and “double bass”. The vowels in focus in each case were IH, AH, OH, and ÅH. During the years I have added a couple of

<table>
<thead>
<tr>
<th>AH</th>
<th>&gt; (core)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OH</td>
<td>&gt; (toe)</td>
</tr>
<tr>
<td>AA</td>
<td>&gt; (car)</td>
</tr>
<tr>
<td>AE</td>
<td>&gt; (else)</td>
</tr>
</tbody>
</table>

Figure 5: Vocal sounds related to a vertical spatial body sensation. The pronunciation is as follows: /Danish/ (English).

Mendelssohn and Ryan considered the throat region to be a very important region functioning as a transition between the head and the body in embodying thoughts and feelings. Results of work in this area often balance, ground and embody the person more as a whole.

Even though the person sounding does not use the vowels mentioned above, the sound quality expressed will reflect the richness of the sound, and how embodied this sound quality is. In other words the vertical body sensation offers a method for graduating how the body is as a whole, as well as functioning as a guide towards a notion of how grounded the person is as a whole. My clinical experience is furthermore, as described in chapter 4.7.2.1, that when the client senses how the sound vibrates and resonates in the body, and when he or she is in physical contact with these vibrations with the hands, it supports a grounding, and a more subtle sensation of body and Self, as well as the ability to be more fully present in the moment.
4.8.3 Feeling the form of the sound
The pain of great suffering can also be heard in one single tone. I did not realise the intensity of that until I really started to listen, and opened myself and my body to the sound I was listening to. I was listening as if I was asking the sound of the one tone to tell me the life story of the client. The form and quality of a single tone carry the content of a feeling. When matching and mirroring the single tone, and giving sound to it as a music therapist, an arousal will always arise, which forms the feelings (see chapter 4.2.3). Hart (2008) describes this process in the following way:

“Other people’s moods can be transferred through an unconscious motor imitation of their facial expressions, gestures, tone of voice, and other non-verbal indicators. Mirroring causes the other person’s mood to be recreated in the observer’s neural patterns via so-called sociobiological choreography.”
(Hart 2008, pp 91 - 94)

In matching and mirroring the CoreTone of the client the therapist is highly active. A reflective listening perspective will support an awareness towards oneself and the client, and what is represented in the intersubjective space, the sounding space.

Because of the mirror neurons, observing or imagining the performance of a particular action generates a pattern of brain activity that is similar to that generated when the activity is actually performed (Stern 2010, Damasio 2010). When a person engages in mirroring another person, he or she usually involves herself/himself in the other person’s action, and tries to understand it from the centre of the other person’s body and mind (Bråten 2006). Stern’s (2010) explanation is that it is an imitation of both the action and its exact dynamic form of vitality.

4.8.4 Listening to the associations - imagery - analogies
Listening to a person sounding, in a flash of a moment a picture of a five year old girl springs into the listeners mind simply because the sound quality of the mature woman is girlish, high in pitch, light and without the bodiness of a grown up woman.

Research within music psychology and neuropsychology shows that it is very difficult to make a clear distinction between perception and cognition. Both processes require brain functions on different levels and depend on the speed of the processes. Furthermore, it is believed that the perception and the processes of interpretation and evaluation of what is heard, is connected to giving it meaning in the context of the interaction as well as of the emotional reaction (Bonde 2009, Spreckelmeyer 2006). As Bonde (2009) points out, this means that it is actually possible to listen to one single tone, and from that, experience meaning and emotions connected to the context. Spreckelmeyer (2006) refers to empirical research which supports this understanding.

From many years of experience in working with one single tone in different contexts I can only confirm that in sounding and listening to one single tone a whole world is expressed and heard connected to the person sounding the single tone. As pointed out in chapter 4.3.3 it is my clinical experience that the metaphor theories go beyond the classical dualism between emotion and cognition (Bonde 2010).

I have furthermore experienced that the more present and open it is possible to be together with the client in the sounding space, using your whole self as a toolbox of resonance, allowing this person to move and touch you emotionally, the more precise and manifold the experience of the sounding person in front of you becomes. This approach and attitude further facilitate the conditions for meeting and understanding the person sounding.
**Summary of the vocal parameters described in the chapter as a whole**

Psychodynamic Voice Therapy employs a variety of vocal exercises based on a glissando movement, singing one single tone and a vocal improvisation. In connection with these exercises several parameters are a natural part of the working method. Among these are pitch and pitch range.

Pitch range is looked into both in the glissando movements and in the vocal improvisation. Within the vocal improvisation the pitch range is studied and explored in connection with a spontaneous expression in span of pitch while improvising. Pitch on the other hand is studied and explored more closely while singing one single tone.

As part of the vocal parameter pitch there also is an awareness towards the fluctuation of the tone. It is observed if the sound of the voice is consistent when singing one single tone, or maybe with a vibrating or shimmering expression. While singing any of the vocal exercises the awareness is also on the breathing pattern (duration of both breathing and sounding) and the fluency and flow of the ongoing breathing and sounding.

The dynamic features like intensity and volume of a spontaneously expressed sound also play an essential role in Psychodynamic Voice Therapy, and focusing on the vocal exercises CoreToneVolume. The Vocal improvisation, the dynamic span of volume, is an element which is explored. Other dynamic features are vocal expressions based on parameters such as compression and air, resulting in either a tense, harsh or a breathy sound. Overall an attention towards flexibility in the expression of different dynamic features also is present.

Listening to a horizontal or vertical spatial body sensation is a body placement parameter. An evaluation of the spatial body sensation is closely connected to observing and evaluating other vocal parameters connected to the vocal quality like timbre, resonance and richness (spectrum of overtones). In the exploration of different vocal qualities, cracks, holes and broken sounds in the glissando movement function as guidelines. Thus also defined as vocal parameters. As mentioned above a general attention is addressed to the parameter embodiment and an integration of different vocal qualities.

Parameters such as form, associations, imagery or analogies are descriptive parameters, based on a subjective sensation of the sound quality expressed in the moment, and therefore differs from upper parameters which can be evaluated. These parameters have this in common that they describe the client’s sound holistically, and aim to capture the holistic essence of the timbre or vocal quality expressed spontaneously. Therefore these parameters are difficult to evaluate. It is far more individual if a form, association, image or analogy can be evaluated as an improving or deteriorating process. Parameters like these have always been calculated as something unscientific and imprecise. Their value is significant in the clinical setting where they offer the client the possibility to listen to herself or himself, as well as being in dialogue with oneself and exploring the hidden stories in the different vocal qualities.

In that way it can be described as an essential part of the working method, which involves both the client and the therapist.

In chapter 2 a summary and a table were presented of the vocal parameters identified and extracted from the literature review. This very same table will be presented again in chapter 7, adding the vocal parameters identified and extracted from my clinical approach and working method Psychodynamic Voice Therapy presented in the summary above.

In chapter 7 a voice assessment profile will be designed. The selection of vocal parameters and the development of the voice assessment profile will be based on this table.
My voice changed character and sounded hoarse and rattling like a monster. My language broke down. I could no longer find the words or place them in correct order. My breathing was reduced to such an extent that the body got too little oxygen and eventually became so drained of strength that I carried myself around like an old man.

Henning Jensen 2006
5. Depression - focus on client population in the study

Introduction
The focus of population in this study is clients suffering from depression. For many years I have applied therapy related body and voice work to this client population. It is my clinical experience that it is always audible if a client is suffering from depression. Since I am using a multiple case study design some considerations can be given to what may be generalized from a number of cases within the same clinical population as a consequence of evaluation over time. When focusing on depressive patients in psychiatry it is also the case study design that enables the reader to observe eventual tendencies in this group according to the phenomenon in its context - the human voice and depression.

In the following, clinical depression will be described both from a traditional medical and a phenomenological psychopathological perspective. Then follows a description of the aetiology. Finally a concise description of the most recommended treatment of moderate and severe depression will be presented based on the National Board of Health Report from Denmark (2007). This is done in order to capture the present tendencies within research which have influenced contemporary psychiatry, where the traditional dualism of psychological and somatic psychiatry no longer is tenable, and a new paradigm is established (Gerlach 2006, Fuchs 2009).

During the last years several basic research studies based psychiatry books have been published. Some of them are more classical whereas others have taken a significant step towards a new paradigm based on a biological, sociological and psychological model. One of these books is “Grundbog i psykiatri” written by Erik Simonsen and Bo Møhl. This book is comprehensive and as something special it also puts the human being at the center. This is something new, as a more reductive view on the human being is traditionally employed. However, it is important to bear in mind that in clinical practice there is still a tendency towards a reductive approach to diagnosis, aetiology and treatment.

"Klinisk psykiatri" (Clinical Psychiatry) is a classic, comprehensive Danish textbook written by Mors, Kragh-Sørensen & Parnas (2009). It is the main basic book in Danish for doctors training to become a psychiatrists. In the latest edition the chapter about affective disorder has been substantially revised, because of many new research discoveries within the field of affective disorder.

1) Erik Simonsen is professor in psychiatry at Roskilde University in Denmark, head of research, psychiatrist head of Psychiatric Research Department, Region Sjælland, and a research lector at Copenhagen University.
2) Bo Møhl is MA in psychiatry, specialist and supervisor in psychotherapy, clinical psychologist at Psychiatric Centre Copenhagen. External professor at Aalborg University
Jes Gerlach\(^3\) (2006) is the author of a detailed book about depression published by The Danish Mental Health Fund\(^4\) directed at clients suffering from depression and their relatives.

The new paradigm affects how the diagnosis, the psychopathology and the etiology of depression can be approached, understood, and explained, and not least how it should be reflected in how clinical practitioners meet the suffering human being in clinical practice.

Recent findings verify that feelings, thoughts and chemical processes in the brain are in a constant interplay. The chemistry in the brain can change feelings and thoughts, while thoughts and feelings can also change the chemistry in the brain (Gerlach 2006, Fuchs 2009). These are very important findings for the multidisciplinary team to bear in mind when meeting a client suffering from depression, and considering different options of treatment.

For me as a music therapist I especially find that these findings are of great interest and importance. In my opinion, the music therapist has a tool corresponding to this new paradigm in its action of treatment, where the action of music therapy implies both the body and the mind.

### 5.1 The nature of the mental illness

Everyone experiences the state of unhappiness, often as a reaction to change or loss. The feelings accompanying this state can be painful, but they will usually be temporary, and it may even turn out that the state can be an opportunity for personal growth and improvement.

When sadness persists and impairs a person’s daily life, it may be an indication of a depressive disorder. The factors that distinguish normal sadness from clinical depression are the severity, the duration, and the presence of specific symptoms, as listed in professional manuals (see below).

When identifying the nature of what the patient is suffering from, data must be collected. These data will traditionally be symptoms or signs. According to the “New Oxford American Dictionary” (2005) a **symptom** is defined as a “physical or mental feature that is regarded as indicating a condition of the disease, particularly such a feature that is apparent to the patient.” According to the dictionary a **sign** is defined as “an indication of a disease detectable by a medical practitioner even if not apparent to the patient.”

A symptom is subjectively experienced and observed as a pathological indicator, physical or behavioural, which may be observed or identified by both the person and healthcare staff. Because of the subtle, even hidden nature of some symptoms, the outward appearance and demeanour of the person may be so apparently “normal” that signs of clinical depression can only be identified by the person or medical staff trained in the field of mental health. With this broad definition a symptom can be a message from the body, the illness or from the patient her/himself.

### 5.2 Making a diagnosis

Worldwide an International Classification of Diseases (ICD) is used, worked out by the World Health Organisation (WHO). Psykiatriski Depilin, Faroe Islands uses a Danish translation of the ICD-10, ICD-10th revision, version 2007 (WHO 2007). This edition has been adapted to Danish conditions worked out by the Danish Psychiatric Society (Dansk Psykiatrisk Selskabs Diagnosevalg) and the Danish National Board of Health (Sundhedsstyrelsen). Therefore I have also chosen to describe the diagnosis of depression with reference to ICD-10 (WHO 2007) plus references to newer medical studies.

Another Diagnostic and Statistical manual of Mental Disorders (DSM) is used primarily in the United States (DSM-IV-TR, 2000). This system is intended to be applicable in a wide array of contexts and used by clinicians and

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3\(^{rd}\) Jes Gerlach is Dr. Med, the leading psychiatrist, at Psychiatric Centre Sct. Hans Roskilde. Furthermore Gerlach in 1996 took the initiative and founded The Danish Mental Health Fund. He was chairman until 2011.

4\(^{th}\) The Danish Mental Health Fund is a private humanitarian organisation which offers courses, meetings and training. It widely offers consultation and psycho-education to people suffering from psychiatric illnesses and their relatives. Psykiatrifonden has published a wide range of books directed at clients, relatives as well as health care staff.
5.3 The diagnosis depression

In the diagnostic system ICD-10 (WHO 2007) clinical depression is defined as a mood (affective) disorder. There are several subtypes. The primary subtypes are depressive episode, recurrent depressive disorder, persistent mood (affective) disorders, and atypical depression.

The depression episode can be an agitated, major depression or vital depression without psychotic symptoms, or it can be an episode of severe depression with the presence of hallucinations, delusions, psychomotor retardation, or stupor so severe that ordinary social activities are impossible. In the case of a severe depression with psychotic symptoms there is a danger of suicide, dehydration, or starvation. The hallucinations and delusions may or may not be mood-congruent.

Depression is considered an illness where the person over a longer period has the feeling of sadness or emptiness, and reduced interest in activities that used to be enjoyed. There may also be sleeping disturbances, loss of energy.
Chapter 5

or a significant reduction in energy level. For a person with depression, concentrating, holding a conversation, paying attention, or making decisions that used to be made fairly easily have become difficult. There may even be suicidal thoughts or intentions. (WHO 2007)

The symptoms of depression appear in different ways in the human being as a whole. It can be experienced and observed in the emotional life, and it can be experienced in the way of thinking (cognition). The body can be observed and experienced in how it functions, and certain behaviours can be identified.

There are many ways a depression can appear. It can come sneaking or develop slowly over weeks or months, or it can come suddenly and strike as lightning. There can be few or many symptoms of different intensity. Therefore it can be difficult to determine what kind of depression a person is suffering from.

5.3.1 Symptoms used to ground the diagnosis - an overview

In ICD-10 (WHO 2007), a diagnosis is based on symptoms. Symptoms can be divided in main symptoms and symptoms accompanying the main symptoms. The main symptoms are lowering of mood, reduced enjoyment and interest, reduction of energy and decrease in activity. The accompanying symptoms are reduced self-esteem and self-confidence, feelings of guilt or worthlessness, sleep disturbance and appetite change, reduced concentration and attention, as well as marked tiredness after even minimum effort, and suicidal thoughts. The accompanying symptoms can also be more “somatic” symptoms like marked psychomotor retardation, agitation, change of appetite or weight, and loss of libido (SST 2007, Simonsen & Möhl 2010).

It is my clinical experience that the feelings of anxiety, reduced patience - irritation, and aggression or pain are also present when a person suffers from depression. This statement is not mentioned in the ICD-10 (WHO 2007), but supported by Gerlach (2006), SST (2007) and Simonsen & Möhl (2010).

According to the ICD-10 (WHO 2007) the severity and numbers of symptoms present will specify the depression as mild, moderate or severe. In a mild depression episode two or three of the above symptoms may be present. The patient will usually be disturbed by the symptoms, but will probably be able to continue with most activities.

In a moderate depression episode four or more of the above symptoms will usually be present and the patient will most likely have great difficulty in continuing with ordinary activities. In a severe depression episode several of the above symptoms will be marked and distressing, typically loss of self-esteem and ideas of worthlessness or guilt. Suicidal thoughts and acts are in this state common and a number of “somatic” symptoms will also usually be present. Severe depression episode is also named vital depression referring to all the biological changes in the body such as reduced metabolic, hormone production of serotonin, the body temperature e.g. (Blue Book of ICD-10. Available in appendix for chapter 6, USB-memorystick).

For all three grades of severity of depression, a duration of at least 2 weeks is usually required to be diagnosed with depression. Shorter periods may be reasonable if the symptoms are unusually severe and have a rapid onset.

Table 1 presents a closer description of the symptoms. In order to give an existential perspective to the clinical descriptions of the symptoms, quotations are added to some of the symptoms by Henning Jensen (a Danish actor), Sylvia Plath and Goethe (famous writers), who have put into words how they have experienced their depression.

Table 1: The quotations are written in italics. Inspired by Gerlach (2006) I have divided the symptoms into four different categories; bodily, emotional, cognitive and behavioural symptoms. The four different categories are presented side by side, because this gives the reader the possibility of both reading about the symptoms category by category or reading each single symptom in relation to descriptions in other categories. In my opinion, this way of presenting the symptoms is more in line with the fact that thought and feeling can change the body and the chemistry in the brain, and the opposite way around. The references connected to the symptoms are Gerlach (2006), Mors et al. (2009), and Simonsen & Möhl (2010).
It is very visible that the person is hoarse. Don’t talk much. The answer is short and often only yes or no. There is an experience that the temporality of thinking is slow, and there are difficulties remembering things or the memory does not function.

“Crash into an inner abyss which was completely paralyzing. I saw everything, recognised everything, but it no longer had anything to do with me. I had left the world around you. The arms hang heavily and without any movement. I reeled around in spasms. I pretended it was night. I couldn’t see the glass bell jar, and not being part of the world.

This symptom is more difficult to carry out with effort. When you stand up, the world seems like a distant, glass bell jar, and not being part of the world. “I could not think two consecutive thoughts without the subconscious visions of horror wedged into them. My brain was blown into atoms. Even common encodings disappeared like phone numbers, birthdays or just to tie my shoes and put on my clothes properly.”

(The danish royal actor Henning Jensen IN: Gerlach 2006, pp 30)

Menstrual cessation

Irritability or anxiety.

A state of being short-tempered and inhibited.

The sleeping problem can be characterized as a state of being defenseless that I couldn’t do it. It was as if the meat fell off the bone. I did not manage to move, or drag myself even two meters from one place to another, for there was not a single pulse left in my body that told me that it was manageable, or for that matter necessary. I lay or sat, empty, lifeless and paralyzed, because I could not do otherwise - and I did it, mind you, hour after hour, day after day, week after week.”

(The danish royal actor Henning Jensen IN: Gerlach 2006, pp 29)
Feeling sad, empty, hopeless or hopeless. Lowering of mood varies little from day to day, but is often unresponsive to trouble concentrating or reduced concentration and memory. It is very difficult to concentrate on glass wall and into a world beside this, a crash into an inner abyss which was recognised everything, but it no longer had anything to do with me. I had left my living. The very power and being, which were the living me, had escaped change in or reduced metabolic in the newspaper do not stick in ones memory. That goes for a conversation as well. The person suffering from a depression.It can be experienced like sitting in a glass bell jar, and not being part of the world. It is very visible that the person is suffering from depression. The gestalt is hardly there, the movements are slow and rigid and the voice is hoarse. Don't talk much. The answer is short and often only yes or no. There is an experience that the temporality of thinking is slow, and there are "I could not think two consecutive Guineas, only I couldn't feel a thing. If Mrs. Guinea had given me a ticket to Europe, or a round-the-world cruise, it wouldn't have made one scrap of difference to me, because wherever I sat - on the deck of a ship or at a street café while walking. The steps are shortened and the gait is slow, as if every step is carried out with effort. When you shake the hand of a person suffering the meat fell off the bone. I did not pretend it was night. I couldn't see the surface gaudy as poppies. But when it came right down to it, the skin of my wrist looked so white and defenseless that I couldn't do it. It was as "I no longer felt that I had any right to exist. This of course led to a total sensation of guilt against everything I had done, and to every man I had been around. And thus destroyed, a sensation arose of total paralyzed aggression - or to put in another way - I turned all outward aggression inward towards my Self in a murderous attack of self-contempt. And since I am a strong person who represents considerable ballast of will, this self-attack was lethal."

(The danish royal actor Henning Jensen IN: Gerlach 2006, pp 39)

Feeling guilty or worthless. These feelings are often exaggerated or inappropriate to the situation. There is a feeling of guilt for things that aren't your fault or over which you have no over, or an intense feeling of guilt for minor mistakes.

"I no longer felt that I had any right to exist. This of course led to a total sensation of guilt against everything I had done, and to every man I had been around. And thus destroyed, a sensation arose of total paralyzed aggression - or to put in another way - I turned all outward aggression inward towards my Self in a murderous attack of self-contempt. And since I am a strong person who represents considerable ballast of will, this self-attack was lethal."

(The danish royal actor Henning Jensen IN: Gerlach 2006, pp 39)

Negative thinking. Ideas of guilt or worthlessness present. Negative or pessimistic thinking. The negative thinking is the depression speaking. Negative thoughts are generated so automatically that they become one of the strongest of habit patterns. The intensity of negative thinking become ideas of guilt, worthlessness and self-reproach.

Thoughts of death and suicide. The types of thoughts vary. Some people wish that they were dead, feeling that the world would be better off without them. Others make very explicit plans to hurt themselves. One of the best ways to prevent suicide in someone who is depressed is to recognise the warning signs of suicide. Take these signs seriously.

"I thought it would be easy, lying in the tub and seeing the redness flower from my wrists, flush after flush trough the clear water, till I sank to sleep under a surface gaudy as poppies. But when it came right down to it, the skin of my wrist looked so white and defenseless that I couldn't do it. It was as if what I wanted to kill wasn't in that skin or the thin blue pulse that jumped under my thumb, but somewhere else, deeper, more secret, and a whole lot harder to get at."

(Goethe, pp 65)

No gestalt. The face is without facial expression, and the body language is restricted or inhibited.

Suffers of decrease in activity. Normal daily actions of personal care like taking a bath, washing your hair, brushing your teeth decrease. Activities outside the home, like meeting with friends and shopping decrease or stop because it does not seem possible to manage at all.
out of bed in the morning. The character of sleep differs from a normal healthy sleep to parameters such as, trouble falling asleep, less deep sleep periods, shorter period from falling asleep to coming into the state of dreaming (REM-latency-period), more dream periods during the night than normally, often waking up during the night.

“A bad dream.
To the person in the bell jar, blank and stopped as a dead baby, the world itself is the bad dream.”
(Sylvia Plath 2003, pp 352)

Pain in different ways and other body reactions - symptoms.
Headaches are fairly common in people with depression, and is part of the daily life in between to suffering from migraine headaches, which may seem worse when depressed. This goes as well for other kinds of pain. Unconsciously muscle tensions in the body can develop, resulting in muscle aches and joint pain. It is very common that depression can worsen any kind of chronic pain worse. Most common is chest, back and stomach pain. Obviously, it is very important to get chest pain checked out by an expert right away. It can be a sign of serious heart problems. However, depression can contribute to the discomfort associated with chest pain.

Jensen IN: Gerlach 2006, pp 31

Reduced self-esteem and self-confidence.
There is a persistent feeling of not being and doing things well enough, neither at work nor at home with the family. That can partly be the reason for starting to withdraw and isolate yourself. The routine work can be experienced as an anchor, and maybe even something used as an excuse for not taking part in the social life, the talking with friends, colleagues and family. There is a growing feeling and experience of being lost and helpless. This symptom is often connected to negative thoughts and self-reproach.

Irritability or anxiety.
A state of being short-tempered and finding it hard to relax. There might be a persistent feeling of worry, nervousness or unease.

Isolation.
Social contact is avoided and activities you normally enjoy is skipped. Even normally activities as for example picking up the mail has stopped, and the contact to family and friends is cut off.
5.4 A phenomenological psychopathological description of depression

Introduction

In the following I will focus on a phenomenological psychopathological description of depression, as presented and described by Thomas Fuchs. Fuchs approaches and describes the phenomenological psychopathology of depression from the perspectives of themes like; the lived and corporeal body, the sensorimotor space, loss of body resonance, derealisation and depersonalisation and temporality and desynchronisation. Themes which in many ways overlap my own approach and understanding of how I myself describe health and psychiatric problems. Additionally some of the themes use terms which are familiar to the music therapy field. Fuchs’ phenomenological psychopathology goes well with the ontological and epistemological background of the project: the theoretical inspirations underpinning Psychodynamic Voice Therapy, the clinical method in the treatment of the clients taken part in this study (as described in chapter 4).

Phenomenological psychopathology may be regarded as a foundational science for psychiatry by people with special interest in this field. Karl Theodor Jaspers, a German psychiatrist and philosopher and a major exponent of existentialism. It explores the basic structures of subjectivity and their disorders and alterations in mental illness using theoretical as well as empirical methods. Its major goal is to gain a deeper understanding of the patient’s subjective experience that is regarded as an indispensable basis for psychopathological and neurobiological research on the one hand, and for clinical, diagnostic and psychotherapeutic processes on the other.

The interest in phenomenological psychopathology seems somehow absent in the psychiatric world. The only significantly productive writer I have found is a German associated professor of psychiatry and philosophy, Thomas Fuchs. In 2001, a small group with special interest in phenomenological psychopathology was founded in Denmark, within Dansk Psykiatrisk Selskab (DPS)6).

Thomas Fuchs (2001, 2005, 2009) critically addresses the focus of cognitive neuroscience, and its effect on how psychopathology within mental illnesses is approached, explained and understood. He additionally puts the mentally ill patient, the human being, at the center. Fuchs writes:

“Psychiatry needs an “ecology of the brain” in order to better grasp the interconnection of psychological, social and pharmacological approaches adequate for its subject. In the end, this subject is not the brain, but rather the mentally ill patient”
(Fuchs 2009, pp 14)

5.4.1 The lived and corporeal body

Through my many years of clinical experience within psychiatry, I have noticed that not all patients show affective symptoms. They can, as mentioned before, be masked by somatic complaints such as fatigue, or be noticeable more as an act of social withdrawal, without actually being aware or conscious of the feelings associated with that withdrawal or how the withdrawal is acted out. One way is to physically withdraw, and another way could be described as not being present.

In chapter 4.1.2 I have described the polarity of the lived and the corporeal body as it is conceptualised by the phenomenological tradition and especially by the French philosopher Merleau-Ponty.

Describing depression in phenomenological

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5) Thomas Fuchs MD, Ph.D, is a German associated professor of psychiatry and philosophy, head of the Section “Phenomenological Psychopathology and Psychotherapy”, Senior Psychiatrist at the Department of Psychiatry, University of Heidelberg. His major areas of research are psychopathology, phenomenology, theory of psychiatry, and medical ethics. His empirical research focuses on depression and mother-child interaction in postpartum disorders.

6) Danish Psychiatric Society (DPS) is a medical company whose main task is to promote Danish psychiatry and Danish research in this area. The intention of the DPS is to ensure the best possible training, and provide access to optimal mental health services, as well as to raise awareness of psychiatry, and thus help to break down and eventually eliminate the many prejudices that still exist in the area.
In clinical practice I often experience depressive patients as stiff, slow and weak in their movements, and without facial gestalt, just as if all vitality has left the body and soul. Some clients even express that they regularly have to remind themselves to breathe, which normally is a subliminal muscular action. A person may also experience bodily sensations that can be likened to an engine stopping pumping energy around, and cognitive problems (or processing problems) where it seems that everything happens so fast it is impossible to perceive it all happening around you, as well as losing track in conversations and starting to feel more and more alien and depersonalised. There can also be a bodily sensation of a gap between the depressive person's experience of real time and space. The body movements are marked by psychomotor inhibition, where movements, gestures and speech are reduced, perhaps only mechanically produced.

As Fuchs puts it:

“The patients look older than they are, their complexion becomes pale, the hair dull. In the worst cases the weight loss may progress to the point of cachexia, and the regulation of the blood circulation gets disturbed. All this literally means a corporealisation, namely in the sense of coming nearer to the corpse, the dead body.”

(Fuchs 2005, pp 109)
5.4.3 Loss of body resonance
Fuchs (2005) further mentions another dimension of body and space, which is the quality of the felt atmosphere, the expression and impression of our affective engagement and participation in the world. There are descriptions such as: *There is something “in the air” or a gloomy atmosphere*, which are used to describe the space around us and grasp the sense of a felt atmosphere, a so-called emotional space, where the body physically experiences that it widens, tightens, weakens, trembles and shakes, and becomes an *instrument* that starts to act congruently with the feelings and atmospheres experienced. According to Fuchs (2005, 2008) the body in a broad sense could be described as a “resonant body”. In many ways Fuchs’ definition of *body resonance* is similar to Langenberg’s (1988, 2005) definition of the *resonating body function* described in chapter 4.8.2.

Fuchs (2005, 2008) describes and defines a resonant body as a most sensitive instrument in which interpersonal and other “vibrations” may reverberate. A person with clinical depression may talk about having a feeling of *not* feeling or maybe not being able to sympathise with the emotional story told to them by their relatives. The person may express difficulties in attuning and sympathising to the environment. It may be explained as if there is an invisible wall between him/her and the rest of the world, and specifically between him/her and their relatives and friends in the immediate environment. The body resonance is therefore evident in order to experience the sensation of being-in-the-world. The consequence of a loss of body resonance is a certain degree of *derealisation* and *depersonalisation*.

5.4.4 Derealisation and depersonalisation
To lose body resonance is equivalent to losing the ability to feel and sense. This often gives the person a sensation of a partial loss of self. Fuchs (2005, 2008) describes this as an experience of how emotional quality of perception is lost. The sensual perceptions remain abstract and cannot be felt, and the space is experienced as empty, hollow so to speak. Only an experience of emptiness is left. Persons and objects around seem hollow and unreal. Close relatives may be cognitively recognised, but the emotions related to the family member are missing. The intercorporeal attunement of gestures, facial expressions, tone of voice, and other “vibrations” fail (Fuchs 2005). This could be defined as existing in a cognitive or abstract space, and not a *lived* embodied space that brings emotional and sensational substance to the experience. Instead the perception only shows the naked framework of the objects. In worst cases of depression the patients do not even sense their body. The senses of smell and taste seem to be gone. Even the sense of warmth or pain is gone.

Sylvia Plath describes her experience of such a state in her depression in the following way:

“The silence depressed me. It wasn’t the silence of silence. I knew perfectly well the cars were making a noise, and the people in them and behind the lit window of the buildings were making a noise, and the river was making a noise, but I couldn’t hear a thing.”

(Sylvia Plath 2003, pp 27)

When a person is so depressive that he or she suffers from derealisation and depersonalisation Descartes’ “cognito ergo sum” is proven wrong and insufficient. A person who only possesses cognitive recognition of persons and the world around her/him has lost the emotional and bodily sensation, and has an experience of not existing, but rather being living dead.

5.4.5 Temporality and desynchronisation
When being depressed a psychopathological time experience such as time moving slowly or an *inhibition of lived time* may appear. Fuchs (2005a) takes the psychopathology deviations of time experience even further by introducing concepts like *embodied* and *intersubjective temporality*.

Time used in good company or when being engaged and absorbed in an activity may give an experience of being in flow and performing fluently with no sense of the time passing.

Fuchs (2005) describes this experience in the following way:
“Lived time runs with the movement of life, implicit in the child’s experience of being engaged in his play and directed toward his goals.”

(Fuchs 2005, pp 195)

This temporality experience is defined by Fuchs as and implicit temporality.

However, when there is a gap between an experience of need and being satisfied, a plan and the realization of this plan, the future is experienced as the temporality of awaiting, striving, or longing for. Fuchs (2005) defines this sensation as an explicit temporality. In other words, the explicit temporality is when time becomes conscious, and is felt as passing by and refusing a fulfillment of the desired, or because something is felt as irretrievably lost. Fuchs (2005) additionally connects the experience of an implicit and explicit sensation of temporality with the sensation of a lived body and a corporal body defined above.

The dimension of the time experience defined above may be connected to an intersubjective dimension of time. According to Fuchs (2001), an attunement of the living being to its environment can be defined as a continuous synchronization on a biological as well as a social level. Intersubjective time may then be considered as a relational order of individual and social processes. This however also implies that there can be an experience of doing something simultaneously or in asynchroneously with respect to relevant others. The latter is an experience Fuchs defines as a desynchronization.

Upper considerations about intersubjective temporality goes well together with Trevarthen’s (2000) and Stern’s (2000) discovery of how a mother-infant dyad consists of synchronized behavior patterns. Trevarthen and Stern further describe how an attachment includes a shared intersubjective intimacy based on a synchronized dyad. They defined this synchronized dyad as the non-verbal communication between mother and infant that helps the child define himself or herself through structured attunements.

Fuchs further distinguishes between two kinds of desynchronization: a state of being “too late” and “too early”. When the experienced time slows down Fuchs defines it as a retardation, and when speeding up it is an acceleration. Both time experiences are temporality sensations appearing in the relation with other (see figure 1).

When being depressed, and with the mutual resonance with the environment lost and the lived body corporalised, the person may have an experience of “falling out of time”. In phenomenological psychopathological terms depression demonstrates that temporality, embodiment and intersubjectivity are inherently connected. As Stern describes it:

“*The issue of coordinated timing is obviously...*
5.5 The aetiology of depression

The more I have read about depression from different perspectives, the closer I have come to the understanding that it is difficult to determine the aetiology behind the depression, and what in the first place has set everything in motion, and in a way made the whole human being “take a wrong turn” both physically and mentally, ending up with a depression. It can be the chemistry in the body, and it can be a bad circle of “ways of living”, but it can also be an emotional experience or social circumstances which set something into motion.

Larsen (2001) describes a traditional theoretical position and considers the aetiology of depression based solely on biological reasons referring to the brain’s chemistry imbalance. He concludes that severe depression is caused by an unbalance in the brain’s transmitter system, and therefore it can be viewed as a brain disease.

Looking into the National Board of Health report from Denmark (2007) there is also a tendency to lean towards this traditional view of the aetiology of depression. Therefore it cannot be any surprise that this approach and attitude still constitute a very familiar approach and attitude within psychiatry today. It is a view based on a strong tradition within natural science.

However, based on the recent research within the area, a substantial amount has happened in the relationship between psychology and biology. This has led to an important paradigm change in the understanding, approach and treatment of psychiatric illnesses. Today depression is considered a result of a complex interaction of sociological, psychological and biological factors (Simonsen & Møhl 2010, Mors et al. 2009, WHO 2012, Fact sheet Nr. 369).

Theoretically, mind and body are now recognised as two aspects of the same phenomenon (Fuchs 2002, 2005a, 2005b, 2009, Gerlach 2006, Simonsen & Møhl 2010). Furthermore it is documented through research, that the brain is flexible, dynamic, and constantly in interaction with genes, as well as inner and outer stimuli (Gerlach 2006, Simonsen & Møhl 2010). Research on neuronal plasticity has shown that the brain is structured epigenetically by the interaction of organism and environment in which we move, behave and live with others (Fuchs 2009).

Therefore I find it relevant when Fuchs (2009) suggests that the aetiology of depression should move towards a development of an aetiology model that is based on a circular causality between organism and its environment, with the brain acting as a mediating entity (Fuchs 2009). I agree that this attitude is the only one which can integrate and embody the new paradigm in our work.

This knowledge is important to keep in mind in understanding the aetiology and considering way of treatment, and it should encourage us to meet each human being holistically in clinical practice.

The aetiology behind the development of a...

The vulnerability-stress model implies that each person has individual strengths and vulnerabilities for dealing with stress (see Figure 2). It is therefore assumed that the cause of depression is not only inherited, but an inherited vulnerability which in a complex interaction with stressful events of biological, psychological or social nature may lead to the development of depression.

5.5.1 Stress factors
Each human being possesses individual existential conditions of being, basically of a psychological and biological nature. A whole human being is a human being in balance, centered, where the individual conditions could be described as being in balance in relation to each other. You may agree with Carolyn Kenny (1989 pp 73, 2006 pp 98) that we are all in the human condition, and that we are prisoners of our condition-limited and bound. This makes our vulnerability to stress individual. At the same time, from a therapeutic point of view our conditions are also paradoxically what allow us to grow, expand and change (Kenny1989 pp 73, 2006 pp 98). In the realisation and acceptance of our conditions the potential of a growing life-quality and the experience of being whole and balanced as a human being are present. Some of our conditions are genetical, some epigenetical, and others are simply shaped during our life and way of living.

There is no single cause of depression. As mentioned above the newest approach of understanding the reasons for developing a depression represents a complex interaction between three categories; the biological, the psychological and the behavioral (social) stress factors (Gerlach 2006, Mors et al. 2009, Simonsen & Møhl 2010). Often people describe a “downward spiral” of events that finally leads to depression.

5.5 Depression - the burden of disease and lost years
According to the World Health Organisation (WHO) depression is one of the most common psychiatric illnesses. In Denmark around 200000 people presently suffer from depression. 125000 of these have a moderate to severe depression, while around 75000 have a milder depression. This represents 2-3 % of the population. Current research suggests that approximately 15 % of the population will sooner or later experience and develop a clinical depression. That is approximately one in six Danes. During the course of a year current research suggests that approx 5 % of women and ca. 3 % of men will develop a clinical depression during a year. (Gerlach 2006, Simonsen & Møhl 2010)

Depression is a very painful illness, and people who have suffered from a depression often say that it is the worst thing they have
ever experienced. A Danish study by Vibeke Nørholm and Per Bech (2006) from Psychiatric Research Unit at Frederiksberg General Hospital examined to what extent depressive symptoms were associated with reduced quality of life in a group of people well treated for schizophrenia, using a general population sample as control group. The WHO Quality of Life Short Form, WHO-QOL-BREF was used for measuring the quality of life, and the Major Depression Inventory (MDI) was used for measuring the depression. The outcome showed that life quality in a scale from 0 - 100 was 75 among healthy people and 65 among people treated for schizophrenia. When depressed the life quality in both cases decreased to 35 (Nørholm and Bech 2006). The conclusion is that it is the depression which most profoundly affects life quality and not schizophrenia.

My clinical experience illustrates that depression is an illness which is underestimated as a mental illness both among youngsters and adults. WHO has found that depression already is the leading cause of lost years of healthy life for women in the 15-44 age groups. Furthermore does depression according to The Global Burden of Disease contribute significantly to the burden of disease, being in third place worldwide, but already at first place in middle and high income countries. (WHO (2008) Global Burden of Disease: 2004 update 46,51) After experiencing the first clinical depression there is a risk of 50 - 70% that new episodes of depression will occur, depending on the time of debut and the intensity of the depression (Simonsen & Møhl 2010).

The conclusion is that depression is a serious illness, which should not be ignored. It is my clinical experience that there generally is not enough engaged in preventing the depression from developing into severe depression before it is treated, especially among youngsters and women suffering from post natal depression. Therefore it should be remembered that depression can occur in people of all genders, ages and backgrounds.

5.7 Treatment
In the following, a concise description of the most recommended treatment for moderate and severe depression will be presented based on the National Board of Health report from Denmark (2007), NICE-report (2004), Gerlach’s book on depression (2006), and Simonen & Møhl (2010). Finally it will be based on the reality of the research study at Psykiatriski Depilin.

When treating depression, Psykiatriski Depilin on the Faroe Islands adheres to the guidelines from the National Board of Health report from Denmark. The Danish commissory from 2007 bases its evaluation of evident treatment mainly on the NICE-report from 2004 (The National Institute for Health and Clinical Excellence, NICE-guideline nr 23: Management of depression in primary and secondary care), the SBU-report from 2004 (The Swedish Council on Health Technology Assessment), and the MTV-report from 2006 (Medicinsk Teknologivurdering within the National Board of Health in Denmark). The report from the Danish Health System covers types of care that people with depression can expect from the healthcare system, whether they receive treatment in or out of hospital, and what they can expect from treatment, including psychological therapies and electroconvulsive therapy.

The National Board of Health from Denmark (2007) recommends the following steps based on the NICE-report (see Figure 3). These are also the steps recommended on the Faroe Islands, but sometimes reality is slightly different, and medicine for different reasons may be applied early in the treatment and without accompanying psychotherapy. There is however put substantial effort into providing easy access to help. This is among other things accomplished by having a close working alliance between general practitioners and Psychiatriski Depilin. Most often people suffering from moderate or severe depression are referred to Psykiatriski Depilin and offered the treatment from the staff at Psykiatriski Depilin. In severe cases the person may even be hospitalized. When referred to Psykiatriske Depilin the choice and decision of diagnosis and treatment plan...
5.7.1 Medical treatment
When treating moderate depression the first choice in antidepressant medications is SSRI (noradrenalin reuptake inhibitor NARI) and combined serotonin and noradrenalin reuptake inhibitor, SNRI), a dual action-antidepressiva. These medications increase the concentration of serotonin and improve the neurotransmission in the brain. When treating severe depression, the same medical recommendations are made, or tricyclic antidepressiva (TCA) are chosen. (SST 2007, Simonsen og Møhl 2010)

WHO recommends that antidepressants can be an effective form of treatment for moderate and severe depression, but should not be the first line of treatment for cases of mild depression. Additionally, WHO emphasises that antidepressants should not be used for treating depression in children and should not be the first in line of treatment in adolescents, but should be used with caution. (WHO, www.who.int)

5.7.2 Electroconvulsive therapy (ECT)
ECT is still considered the most effective treatment. According to Simonsen og Møhl (2010) there is an 80 % treatment response. When an ECT-therapy is completed, medical treatment is started or continued in order to prevent relapse.

The indications for ECT-therapy is a depressive stuporous condition, acute suicidal risk, and if the person is resistant to applied treatment. Relative indications may be a need for quick treatment response, if the person is in agony, is delusive, diagnosed with a melancholic depression or suffers from a coronary heart disease. (Simonsen og Møhl 2010)

5.7.3 Psychological treatment
Gerlach (2006) points out that there are three principal steps in treating depression.
1. Step: Psychoeducation. Talking about and teaching what depression is.
2. Step: Psychotherapy of some kind, focusing on mild to moderate depression.
3. Step: If step one and two do not have any effect, medical treatment is started. In most cases only applied with severe depression.

In Step 2 Gerlach (2006) does not recommend any specific form(s) of psychotherapy, but clarifies that the same biological changes
are achieved after a successful treatment either by medical treatment or psychotherapy alone. It has been found that these biological processes can be affected by psychosocial support, change in “way of life”, psychoeducation and psychotherapy. Thus, many ways lead to this inner process which results in the remission of depression. It is further pointed out that in Denmark most psychologist use methods from one or several of the following traditions: Cognitive Therapy or Cognitive Behavioral Therapy, Interpersonal-therapy and Psychodynamic or psychoanalytical therapy (Gerlach 2006) At Psykiatriski Depilin however Music Therapy can be added.

For many years music therapy at Psykiatriski Depilin has focused on offering individual as well as group music therapy for clients suffering from depression. During the last 3 years more specific music therapy has also been offered to women suffering from recidive or post natal depression. Psychodynamic Voice Therapy is the primary choice of method in the music therapeutic treatment of depression as described in chapter 4. It is however important to bear in mind that the purpose of this study is not to show evidence of this music therapy method, but to research how an assessment profile focusing on the human voice can be developed.

Psykiatriski Depilin has offered all staff members a basic training in Cognitive Therapy. This is done in order to have something in common across disciplines at Psykiatriski Depilin, but also to be able to offer individual therapy as well as group therapy based on Cognitive Therapy by nurses. Furthermore an ongoing psycho-educative training is carried out in groups with intended clients as well as their relatives. Following the recommendations from the National Board of Health the treatment of depression includes psychoeducative parts in the treatment.

Looking into the recommendations from the National Board of Health report from Denmark Cognitive Therapy, Cognitive Behavioral Therapy, Interpersonal Therapy or problem-solving treatment are highly recommended. In connection with recidivist depression Mindfulness-Based Cognitive Therapy is recommended.

Today all treatment within psychiatry should be evidence based. However it is also stated that the choice of psychological interventions should be based on the patient’s preferences, an informational dialogue and the patient’s primary experience with treatment (SST 2007, Simonsen og Møhl 2010).

**Summary of the approach to and understanding of clinical depression**

Clinical depression has been described both from a traditional medical and from a phenomenological psychopathological perspective. Symptoms and signs of depression have been elaborated by quotations from persons describing *what it is like* to suffer from depression. In other words clinical depression is approached both objectively and subjectively. It is my opinion that if symptoms and signs of depression should be properly understood or identified, a phenomenological psychopathological approach is needed. In my opinion, future psychiatry must include this “*what it is like*” approach consciously and structured in daily practice. Especially when the treatment wants to place the human being - the patient - at the center. There still is a tendency towards a reductionist approach to diagnosis, aetiology and treatment, and therefore there is a risk for the very concept or understanding of depression to be oversimplified.

Fuchs’ phenomenological psychopathological description of depression addresses themes like: the *lived* and *corporeal body*, the *sensorimotor space*, *loss of body resonance*, *derealisation* and *depersonalisation* and *temporality and desynchronisation*, which in many ways overlap my own approach and understanding of Psychodynamic Voice Therapy as well as my understanding of health and psychiatric problems. This phenomenological psychopathological description of depression is closely related to Stern’s (2010) understanding of dynamic forms of vitality to Trevarthen and Malloch’s theory of communicative musicality and intersubjectivity, as well as to Hart’s theory of developmental neuroaffective psychology and Damasio’s theory of "the feelings of what happens". Therefore I
consider the phenomenological psychopathological description of depression as providing something “between” the subjectively felt and sensed experiences and the traditional objectively defined symptoms. This is more in line with the new paradigm based on a biological, sociological and psychological model and the fact that thought and feeling can alter the body and the chemistry in the brain, and the opposite way around.

Fuchs’ phenomenological psychopathological description of clinical depression includes an awareness towards the dynamic features of subjective experience involving “vitality forms” as defined by Stern (2010) or the feel of being alive. The dynamic features are an essential part of human being’s existence, communication and expression. These are missing in the traditional description and definition of depression. Therefore I also consider Fuchs’ phenomenological psychopathological description of depression as a supplement to the traditional definition of depression. It provides elements of a broader approach to and understanding of the possible aetiology of depression. An adequate distinctions in the phenomena or experiential realm from a multidisciplinary approach will broaden and provide the best conditions for classification and treatment.

This will furthermore affect how clinical practitioners can meet the suffering human being in clinical practice. The field of music therapy is highly aware of the dynamic features and clinical music therapy practice is often based on them. Therefore, these dynamic features are in focus when constructing and designing a voice assessment profile, which is the topic of chapter 7.

7) See chapter 4.2.3 about arousal, dynamics and forms of vitality.
All my being is song, and I sing as I draw breath.

Orpingalik
from the Netsilik Inuit - Canada
Chapter 6 focuses on the collection of data; voice samples. These voice samples are applied in the testing of a developed voice assessment profile (VOIAS) presented in chapter 7, as well as in the psychoacoustic analysis presented in chapter 8. Both clinical voice samples and non-clinical voice samples were collected.

The clinical voice samples were collected from the target population in this study, clients suffering from depression. As mentioned in chapter 3.5 the external validity is related to what extent the result of the research study can be applied in a larger context and generalized. This study endeavors to examine and prepare the possibility of applying the VOIAS in a larger context later. Therefore careful consideration must be taken regarding the focus population of the study. Since I have applied therapy related body and voice work to clients suffering from depression for many years, and it furthermore is my clinical experience that it is noticeably audible if a client is suffering from depression when listening to the expression of the human voice, this client population was chosen.

The non-clinical participants, one woman and one man, were recruited in order to illustrate normal voice functioning and function as a reference for the analysis.

First the setting for collecting clinical voice samples is described. Then follows a description of criteria defined for the recruitment of clinical subjects. A protocol is developed for data collection as well as for the vocal assessment, and is described in detail. The aim of the protocol and the procedures for vocal assessment are concerned with exploring and establishing practicable procedures for collecting data, as well as being utilisable in the daily function as a music therapist.

6.1 The setting: The conditions for carrying out my research study and collecting data

My daily practice as a music therapist is connected to Psychiatric Center (Psykriatriiski Depilin) at the main hospital in Tórshavn in the Faroe Islands¹ (see figure 1), which covers all the Faroe Islands. Presently I am the only music therapist on the Faroe Islands. I have worked and been employed at Psychiatriiski depilin as a music therapist for 10 years, and during this time I have mostly been in contact with clients suffering from different affective and personality disorders, as well as different forms of anxieties, both in adult and child/youth psychiatry.

¹) The Faroe Islands consists of 18 small islands under the sovereignty of Denmark. They are situated between the Norwegian Sea and the North Atlantic Ocean halfway between Norway and Iceland. Faroe Islands have a population of almost 50,000 people. The population of the capital city Tórshavn is 18,880 in June 2013.
Figure 1: Psychiatric Depilin is one ward (coloured yellow) of several at the National Hospital of the Faroe Islands (Almanna- og heilsumálaráðið 2007).  
D1: Out-patient treatment. This ward is only open during the week.  
D2: Closed ward. Offers 8 beds. This ward also functions as an acute emergency department.  
D6: A day ward, which presently offers out-patient treatment broadly according to diagnosis.  
The placement of the music therapist and the psychologists is coloured orange.
Psykiatriski Depilin is a small hospital ward where almost 700 people are offered treatment. However, it is important to understand that although this nation and the psychiatric department are small, it still is a nation and a department dealing with the same psychiatric problems as elsewhere.

Figure 1 also clarifies my placement as a music therapist in the organisation, illustrating that the music therapist is teamed up with the psychologists. This visualises the acceptance of music therapy as an academic education with the competences of being able to offer a variation of psychotherapy and clinical assessment in line with the psychologists.

Figure 1 however does not justify how the structure of Psykiatriski depilin is at present nor does it clarify how we work. While I carried out my research study a comprehensive re-organisation took place and is still going on. Psykiatriski Depilin has changed from having a strong hierarchy structure into a flat or more round structure. The vision of Psykiatriski Depilin is to put the patient at the center of the treatment, to work holistically, to offer a high quality in treatment, and in a way which will mark the overall attitude and approach towards Mental Health in the society. The consequences the reorganisation had on the study will be described in chapter 6.1.4.

6.1.1 The interdisciplinary team
I am a staff member in an interdisciplinary treatment- and clinical assessment team. During my period as a PhD-student I have split my time equally between research and my normal function as a music therapist at Psykiatriski Depilin. Presently Psykiatriski Depilin has only one psychiatrist available and four doctors educated as “general practitioners” with many years of experience within psychiatry.

Furthermore Psykiatriski Depilin has positions for five psychologists, one music therapist, two social workers, four occupational therapists, 1 ½ physiotherapist, and a broadly educated nursing staff.

These professions make up the interdisciplinary treatment and clinical assessment team. When the music therapist was integrated in the team 10 years ago, a position as a doctor was converted. Presently there is a nomination for four psychiatrists, four doctors, and five psychologists, which means that Psykiatriski Depilin has been forced to compensate for some of the missing and needed staff by having a few consultants come mainly from Denmark. In adult psychiatry two psychiatrists come steadily for one week every month. Psykiatriski Depilin is also collaborates with the National Hospital in Copenhagen, Denmark (Rigshospitalet).

6.1.2 The music therapist’s position
At the time when my research study was carried out there were two daily interdisciplinary conferences, which all staff members who were a part of the interdisciplinary treatment and clinical assessment team attended. At these conferences all clinical treatment decisions were undertaken. When a patient was referred to Psykiatriski Depilin a clinical assessment team was established. This team consisted of doctors, psychologists, occupational therapist, and a physiotherapist, and in some instances also the music therapist. The music therapist was proactive, which in this context means that it was both the organisation and myself who took the initiative of what I could offer.

When the clinical assessment team had done its work the case was brought to conference where it was decided what possible package of treatment could be offered in the specific case, including health service recommendations, and applying the relevant professional resources at Psykiatriski Depilin.

As part of the interdisciplinary team I was always present at these conferences. I experienced the clinical conferences as an essential and important part of the interdisciplinary teamwork, because it was in this forum the collaboration between professions was established and carried out. It was also in this forum clients could be referred to music therapy.

The responsibility of offering the best possible treatment to the patient according to her / his
needs was therefore based on the clinical assessment and interdisciplinary reflections at these conferences.

6.1.3 The music therapy clinic
The music therapy clinic is located in the building of the Ambulatory, and my office is placed in the same unit as the psychiatrist, doctors and psychologist. The music therapy clinic is around 50 m² where the floor is covered with linoleum, and natural light has the possibility of entering the room pleasantly. The space offers good conditions for carrying out Psychodynamic Voice therapy, because it is big enough to enable free movement, and even having groups with up to 10 people without getting a crowded sensation. These favourable conditions mean a lot in the practice of different working methods.

6.1.3.1 The daily practice of the music therapist
When a client is referred to music therapy, I usually offer an information session with the client where we discuss the reasons for being referred, as well as the present experience of her/his psychological state of being. It is my clinical experience that when a client is referred to music therapy, he/she is sometimes offered a therapy and working method, which the client does not expect. It still is common sense that referral to psychotherapy means being referred to a psychologist. As mentioned in chapter 5.7.3 the choice of psychological interventions should be based on the patient’s preferences, an informational dialogue and the patient’s eventual experience with treatment (SST 2007, Simonsen and Møhl 2010).

In each case there are individual sufferings. These are identified and discussed in the information session, and related to the possibilities of music therapy as a choice of treatment or assessment. Sometimes I find it necessary to offer up to three music therapy sessions where different methods and role plays are introduced and tried out, before coming to terms. The approach all depends on the client, the psychiatric problem and how I am able to meet the client. In many ways I consider these first steps a way of defining a contract for the treatment and it is important that both the client and I can see the purpose. Therefore this information session is also about exploring if the psychotherapeutic method offered is the right method for the client and the very beginning of building up an alliance. I rarely experience a client declining even when offering Psychodynamic Voice Therapy.

As clarified in chapter 3 the clinical relevance of this study to some extent directs the methods employed. Therefore many of the procedures applied in connection with the study are either the same as or not so different from my daily practice and function as a music therapist, and the daily procedures within Psykiatriski Depilin. The procedures will be described in detail in this chapter.

6.1.4 An ongoing reorganisation at Psykiatriski depilin
As mentioned above a re-organisation of Psykiatriski Depilin started and was running while I carried out my research study. It did to some degree affect my research.

In the beginning of my research study I had another and very small music therapy room. Exactly when I had collected data from the first session of two of my clients taking part in this study, I was offered the music therapy clinic room described above. I knew it was a matter of taking the offer given me or I would lose it. So thinking about my future possible working position I accepted the new music therapy room, and recorded the rest of the collected data there. This are of course not optimal conditions for my research study, because there are acoustic differences between the two spaces.

Furthermore the interdisciplinary teamwork was challenged by the a reorganisation. This resulted in one client drop-out from receiving Psychodynamic Voice Therapy and recruited for the study, due to communicative and interdisciplinary problems.

6.2 Protocol for recruiting participants
The design of this study is as described in chapter 3.4.2 an Emergent sequential exploratory mixed methods design with emphasis
placed on the second, quantitative phase. In other words, this study is primarily concerned with establishing and testing a practical and clinically useful Voice Assessment Tool (VOIAS). Additionally the research examines whether VOIAS is applicable to evaluate change over time in a music therapy treatment. Therefore my concern in collecting sound samples was focused on recruiting clients that would complete a music therapy treatment with Psychodynamic Voice Therapy as the applied method. In other words a convenience sample where the clients recruited represent a sample of a population selected because it is readily available and convenient.

As described in chapter 5 I focused on sound samples collected from people suffering from and diagnosed with depression. Therefore it was planned to recruit clinical subjects from Psykiatriciski depilin for the research study, and a small group in order to focus on detail in the study. Initially three women and three men were recruited. Furthermore it was planned that non-clinical participants, one woman and one man, should be recruited in order to illustrate normal voice functioning and thus give perspectives to the clinical measurements. In the psychoacoustic analysis which is carried out in chapter 8 the analysis of the non-clinical participants functions as a reference illustrating how a non-clinical voice appears.

However it is important to distinguish this from a baseline measurement. A baseline would require more non-clinical sound samples. It will in chapter 8 be clarified in more detail how the non-clinical participants function as a reference.

The following criteria were defined for the recruitment of clinical subjects from Psykiatriciski depilin:

**Inclusion criteria**
- Normal cognitive ability
- Functional communicative skills
- Diagnosed with moderate to severe depression
- Age range from 18 – 55 years old

**Exclusion criteria**
- trained singers
- patients who have already received music therapy
- patients diagnosed with physical voice impairment / problems

The following criteria were defined for recruitment of non-clinical subjects:

**Inclusion criteria**
- age range from 18 - 55 years old
- they have not tried this therapeutic working method (music therapy) before
- they are not trained singers

**Exclusion criteria**
- persons diagnosed with physical voice impairment / problems.

Since my research study was founded in clinical practice, and I all the way through this research study have divided both my time and clinical attention equally between the research study and my normal function as a clinician, I did not find it necessary to change the department’s referral procedures in order to have clients referred to the research study. It could follow daily practice (see chapter 6.1.3.1).

I did however inform and direct the awareness of my colleagues in the interdisciplinary treatment- and clinical assessment team towards my research study, and my choice and focus of client group. Additionally I informed about my need for support in getting enough participants for my study.

**6.2.1 Participants recruited**

It turned out to be difficult to recruit male participants for the study. It never became possible to recruit more than two. As for the women, I had recruited three clinical participants in the beginning, but as mentioned above, one of them dropped out due to communicative interdisciplinary problems.

The subjects taking part in this study were finally two women and two men diagnosed with severe depression, who all accepted and made a contract about a music therapy treatment with voice as their main instrument for 12 sessions. In table 1 the partici-
pants are presented with the very basic information. A more detailed presentation of each client will appear in chapter 8, enabling a psychological interpretation related to the psychoacoustic analysis of the sound samples and the therapeutic process.

The two non-clinical participants, one man and one woman, had one music therapy session where the assessment protocol was undertaken. In table 2 the non-clinical participants are presented with the very basic information.

The selection of three of the participants followed the inclusion and exclusion criteria. The fourth, a woman, had been offered music therapy before and also had a background including vocal training, both defined as criteria for exclusion. However, the music therapy method she had been offered was not Psychodynamic Voice Therapy. The fact that she had a background including vocal training did not affect her present vocal expression. As a matter of fact, her voice was severely affected by her psychological state of being, and exhibited all the vocal characteristics categorised as depressive in my clinical experience. Furthermore, the client questioned the fact that her voice sounded like it did, when not having a cold or other physical or somatic explanations. Clinically I had no doubt that the Psychodynamic Voice Therapy would be a good choice for this client. Therefore I could see no reason why I should not offer her exactly the same treatment, following the same directions, as the other participants referred to music therapy and offered Psychodynamic Voice Therapy as part of this research.
I discussed and reflected upon this together with my supervisor, and because of the arguments presented above we decided to include the women in the study despite defined criteria.

6.3 Ethical concerns
This study is primarily concerned with exploring if and how a practical voice assessment tool can be established and tested. According to Corey et al. (1998, as cited in Dileo, 2000, pp 43) unethical practice can result when therapists use techniques with which they are not familiar or skilled in. In this case - I as the music therapist and the researcher - had clinical experience with applying body and voice work to people suffering from depression. This ensured that none of the non-clinical or clinical participants recruited for the study were subject to invasive interventions, or which were likely to have damaging side-effects.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Age</th>
<th>Job status</th>
<th>Marital status</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB - woman</td>
<td>25</td>
<td>Active</td>
<td>Married</td>
</tr>
<tr>
<td>BC - woman</td>
<td>44</td>
<td>Receiving pension</td>
<td>Married</td>
</tr>
<tr>
<td>DC - man</td>
<td>47</td>
<td>Active / sick leave</td>
<td>Divorced/single</td>
</tr>
<tr>
<td>BD - man</td>
<td>38</td>
<td>Active</td>
<td>Single</td>
</tr>
</tbody>
</table>

Table 2: Basic information on the two non-clinical participants.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Age</th>
<th>Job status</th>
<th>Marital status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woman</td>
<td>33</td>
<td>Active</td>
<td>Married</td>
</tr>
<tr>
<td>Man</td>
<td>31</td>
<td>Active</td>
<td>Married</td>
</tr>
</tbody>
</table>

Table 1: Basic information on the four clients suffering from depression.
All participants recruited for the study were informed about what the treatment Psychodynamic Voice Therapy included. This information included a description of the purpose of working with body- and vocal exercises in the treatment of depression. It also included a description of how the body and vocal exercises were related to the individually experienced sufferings as a result of the depression. In other words, the client’s needs were in focus in order for both the client and the music therapist to agree and come to terms with the specific choice of treatment. This also meant that the client and the client’s needs were in focus. Therefore it was always possible for the client to withdraw from the treatment, the trials and the study at any stage in the process. This action did not differ from daily practice.

All participants were asked to sign a consent form to take part in the study (see Appendix 7, the Consent). The participants received full information regarding the purpose of the study and the procedures and risks of how the voice samples of their performances of the different vocal exercises were applied in the study. All participants were guaranteed anonymity in data collection and data reporting both in the PhD thesis and in subsequent publications. (Dileo 2005)

The audio-recordings were used as raw data material in the first tryout of the VOIAS (chapter 7). The sound samples selected were cut so they only included the performance of the vocal exercise. In the first try-out the voice samples appeared in randomised order on a CD, as examples of different sounds, without any information at all. The CD was returned to the researcher after the tryout.

The voice samples are also used by the researcher in order to carry out a psychoacoustic analysis. The ethical concerns relative to this part of the study will be described in chapter 8.

6.4 The informational dialogue prior to the music therapy sessions for the participants included in the study

As mentioned in chapter 6.2, my concern in collecting sound samples was focused on recruiting clients that would complete a music therapy treatment with Psychodynamic Voice Therapy as the applied method. Therefore did the informational dialogue with the clinical participants possible for recruiting in many ways not differ from my daily practice as clarified in chapter 6.1.3.1 when clients were referred to music therapy. A part of this informational dialogue included ethical concerns as described above, and therefore the client always had the right to refuse what was offered. In that way the informational dialogue did not differ from my daily practice.

The only difference from daily practice was that when the client and I had come to an agreement about Psychodynamic Voice Therapy being the treatment method, the next step would be to inform the client about the possibility of taking part in my research study. In the first three out of five cases I found myself experiencing the dilemma of both being the music therapist and the researcher. My experience of this dilemma will be described in the following section.

6.5 The dilemma of being both the music therapist and the researcher

There are different dilemmas connected to being both the music therapist and the researcher. In my case this dilemma gave me ethical concerns.

A client is referred to me with the purpose of being met, seen and offered help. In the first three cases out of five I found myself not being able to bring forth my needs as a researcher in the informational dialogue. In other words I acted more as a clinician than as a researcher. The reason was that my awareness was on the client’s present needs and conditions. This disturbed my plan of also telling the client about my research study and the possibility of participating in it. I had a sensation of bad timing and ethical concerns, thinking that it was too much at the present time and situation for the client to also cope with a substantial amount of
information about a research study besides the sufferings and the need for treatment. I also had concerns about how this information would disturb the clinical situation of meeting and taking care of the client. The consequence was that I ended up with risking my data collection, because I postponed asking if the client would participate in the study. At this later point in time the participants of course still had the right to refuse to allow their vocal performances be included in the study. This action may be considered both a design and an ethical problem.

It is part of my daily practice that I carry out a mid-way and a final evaluation of the therapy treatment. This follow up dialogue is about evaluating the client’s individual themes and wishes relative to an outcome of the therapeutic treatment. In these three cases I ended the final dialogue with a post informational dialogue about the study and asking for the clients consent to take part in the study. All three participants accepted and signed the consent form.

6.6 Methodology for developing a protocol for Vocal Assessment

In the literature review, chapter 2, it was revealed that in order to assure quality of how clinical music therapy practice is evaluated, there is a need to address methodological processes in music therapy evaluation; processes such as data collection, data categories and measurement, areas of evaluation, interpretation and reports, relation between assessment and evaluation, evaluation of treatment effectiveness and other related points (Wigram 1999, 2002; Sabbattella 2004).

The aim of this study is to design a general model of a voice assessment profile focusing on the human voice, while not being fixed to a certain clinical working method. In other words, it is an aim that the vocal assessment profile can be applied if or when a music therapist is working with a client who is singing or doing vocal exercises. The purpose is also to evaluate different vocal parameters and observations of the human voice from different perspectives. In order to do so it is necessary to use different vocal interventions, and develop an effective and systematic procedure for carrying them out. At the same time, it is also important to be realistic about what can be applied in clinical practice and with the client group in focus for this study. Loewy (2002, pp 50) writes:

“The format of an assessment session is critical. The level of structure or free flow provided can best be determined by the kind of client being assessed.”

With this quotation the client and clinical practice are also taken into account when developing and designing a protocol for data collection, and the importance of applying a certain free flow is pointed out.

6.6.1 Reflections on interventions to be included in the protocol

When developing the protocol I first of all thoroughly reviewed my own working method and daily practice of “Psychodynamic Voice Therapy” in the treatment of depression (chapter 4). Here I found a structured, fluent and dynamic way of how one intervention would naturally lead to the next. They appeared in such a way that the client hardly noticed how the different interventions increased gently in complexity and degree of challenge.

From this practice I could extract four vocal interventions essential for performing a vocal assessment and including the study of different vocal parameters. The four vocal interventions were the glissando movement, the CoreTone, the CoreToneVolume and the vocal improvisation. As presented in chapter 4 the glissando movement can be carried out in many different variations. It is my clinical experience that the open sounding glissando movement is the variation that has provided me with the most information in clinical experience (see chapter 4.7.1.3). However, I am aware that most often the human voice within the field of music therapy is used for singing songs, and therefore I also included this intervention in the protocol, ending up with the following five interventions:
1. An open sounding glissando movement including an ascending and descending glissando movement in one motion.

2. Sounding one note; - the CoreTone

3. Sounding a crescendo and decrescendo on one note; - the CoreToneVolume,

4. A song; - Happy Birthday

5. A vocal improvisation.

The challenge for me was to integrate the song and the improvisation in the protocol in a way that felt natural for the client and myself to carry out. Normally I would let the more simple interventions gradually grow into an improvisation as part of a fluent dynamic working process, without much verbal explanation to the client. I never start out a music therapy treatment by focusing on Psychodynamic Voice Therapy as a method by doing vocal improvisations, because this could be experienced as overwhelming and frightening by the client.

After discussing this issue with my supervisor I ended up deciding to prepare the client for the growing complexity by explaining that they might or might not find the next couple of exercises more challenging.

I tried out the designed protocol in clinical practice before using it with the clients for my data collection, to see if it was realistic to apply it.

Again, by looking into my own “way of working” I found different “tools”, which could support the client in carrying out the intervention. Some clients had to walk around in the room to set themselves into motion not only physically, but also vocally, while other clients needed a clear image to build up a safe place allowing them to play vocally freely.

Others again needed to start with the comforting sensation of a single tone, and then having this grow gradually into a free improvisation, either by walking around or sitting on a chair with closed eyes and focusing on the imagery. These difficulties helped me to stay close to the reality of clinical practice.

6.6.2 The audio recording

As mentioned earlier, it is routine to record the music therapy sessions (see chapter 6.1.4.1).

Working in psychiatry, and thinking beyond this research study, I wanted the practice of the vocal assessment not to interfere and challenge the client unnecessarily, not to interfere with my working method, while at the same time wanting to make sure that the quality of the recording was good enough for further quantitative analysis. This was the reality of daily life, and I found it important to research if an assessment based on audio recording of a natural setting could work out, taking this into consideration.

Therefore I consulted the “Finnish Centre of Excellence in Interdisciplinary Music Research” in Jyväskylä (Finland), and asked Prof. Jaakko Erkkilä and Tuomas Eerola for advice.

Taking the description above into consideration I was told that the most important thing was to record the sessions in the audio file format WAVE, which is an uncompressed audio in the linear pulse code modulation (LPCM) format, a standard audio file format for CDs for example. This format would make it possible to perform software analysis of the recordings.

Staying with the client’s primary needs, and what is realistic in clinical practice, I excluded the idea of using headsets for recording the assessment and music therapy sessions, and instead I worked out a way of placing the client approximately at the same spot in the music therapy room. The client’s needs to be able to carry out the interventions were in focus, and it was up to me to establish a setting enabling the client to succeed in doing all the interventions.

Psychoacoustically the music therapy room is very lively, and it could be discussed if the acoustics in general will have influence on the quality of an analysis. However, the acoustics of the music therapy room did not have consequences for the first tryout of the VOIAS because the focus was on testing how applicable VOIAS was, and what constitutes a valid and reliable voice assessment tool as well as the inter-reliability.
6.6.3 The protocol for vocal assessment and its application in clinical practice
When a music therapy treatment has been decided, and we meet in the music therapy clinic, it is my daily practice to inform the client about my routines of audio recording all sessions, and how it is my experience that it is very valuable to be able to listen to the music we produce in the sessions. The client is also informed that the audio recordings are considered confidential material between the client and myself, and not something I would present or play to others without permission from the client. In that way the audio recording itself is an integrated part of the music therapy treatment.

In any first music therapy session it is my daily practice to define themes and wishes for the outcome of the psychotherapy treatment in collaboration with the client. In each case there are individual sufferings. These are identified and a 10 point Visual Analogue Scale (VAS) is constructed at that time. The client marks on the line the point that they feel represents their perception of their current state. This scale is of most value when looking at individual change within the therapy process over time. When a mid-way and final evaluation are carried out the dialogue about the therapy process is based on the individual VAS.

Upper daily practice offers an opportunity to integrate and apply the developed voice assessment protocol as a natural part of the clinical practice. The client was introduced to the possibility of relating the experiences of the vocal assessment with the mid-way and final individual evaluation of the therapeutic process.

Each music therapy session was planned to last maximum 60 minutes and included an opening and closing conversation, as well as a warm-up and vocal exercises, which will be described in detail later. The setting presented itself as a normal music therapy session where the human voice was chosen as the main instrument for the music therapy treatment.

Each participant (two women and two men) was to receive 12 sessions, approximately one session a week. Clinical voice material was to be collected from the first, seventh and the last session for the research, in order to document possible changes over time.

6.6.3.1 A concise description of the protocol for vocal assessment
Before collecting the clinical voice material, I always started with mandatory grounding exercises, based on Psychodynamic Voice Therapy’s basic body and vocal interventions, following the same procedure (see appendix 4, The procedure of the mandatory grounding exercises). The interventions were carried out to nourish the awakening of the client’s awareness towards her-/himself and in being present as well as nourish a grounding sensation in the body and within. This was followed by the assessment of the client, including the five selected vocal interventions.

In the following, the five interventions selected are defined and described in detail.
6.6.3.2 The first intervention: the Glissando

The glissando movement is divided into two parts. The client was instructed to start by sounding in an ascending movement from the lowest possible note she/he could sing the sound /Ah/, and then slide as fluently as possible all the way up to the highest possible note she/he could reach in sound. Then the client was instructed to breathe in deeply, and to start a descending glissando movement from the highest possible note she/he could sing the sound /Ah/ and then slide all the way down in a sighing style until she/he had reached the lowest possible note she/he could sing.

Movement and imagery connected to the motion of sound:

To support this ascending and descending glissando movement, I asked the client to focus on an experience of carrying something heavy, or a burden; something which she/he wanted to get rid of or throw away. I instructed the client to imagine that she/he lifted up this heavy burden from the floor with her/his hands. When she/he reached the chest area, she/he was instructed to tightly clinch the fists, as if squeezing the heavy burden into a compact consistence of a ball. This imaginary ball she/he moved up high over her/his head, while turning the fists. Then in preparing to throw the heavy burden far away the fists were gathered - almost touching each other back to back over the head - pulling all possible energy, and then intentionally throwing it away from her/him and her/his body, while opening the hands and letting go of the imaginary ball of heavy burden, while letting go of the highest possible note to sound, emptying the lungs of air.

While still with the hands in the air I instructed the client to turn around her/his open hands as if she/he was going to receive something which was good for her/him. Simultaneously she/he took a deep breath, and started a descending glissando movement from the highest possible note the client could give sound to, and then she/he slid all the way down sounding in an /Ah/ in a sighing style. At the same time she/he placed the body in a gentle shaking motion horizontally until she/he had reached the lowest possible note she/he could give sound to until the point where there was no sound but the sound of breathing.

At this point the client’s whole torso was bended forward and downward as relaxed as possible, letting go of all the tensions in the lower part of the back, the shoulders and the neck.

First I modelled it for the client, and then we performed it together twice, and the third time the client performed it on her/his own, while I followed and supported the client closely by doing the body movement together with her/him.

2) To support upper explanation watch the reference video of the “Glissando” appendix for chapter 6, USB-memory-stick.

6.6.3.3 The second intervention: the CoreTone

The CoreTone is about giving sound to a single note. It is not a spontaneously chosen pitch for this note, but a pitch found following the instructions of the music therapist. These instructions are described below, and as you will see the single note grows out of the here and now.

The sound of the CoreTone includes a sustained Ah sound, a vowel pronounced as in the word “farther” or “car”, at a comfortable pitch and loudness level. This will most often be the middle-frequency, the “loose string” where the vocal instrument is most relaxed. The CoreTone is not a fixed pitch. It will change according to mood, energy or state of being. In other words, the CoreTone is a dynamic phenomenon.

Description of the exercise

The client was instructed to place one hand on top of the other covering the chest bone. Then the client was asked to imagine that when she/he was going to give sound to the CoreTone, sounding from the chest area covered by the hands. The client was also told that while giving sound she/he might sense the vibration of the sound in her/his hands. Then the client was instructed to talk about something; it could be anything. It could be about the weather or about how she/he now
was going to find her/his CoreTone for this present moment. While talking the client was asked to listen very closely to the melody of her/his speech. The speech was kind of circling around one single note. The client could come closer to the pitch of this note, the CoreTone, by sustaining different vowels a little longer in the speech in general. Then finally the vowel came out as a note sounding at a comfortable loudness level in the form of the sound Ah as in the word “car” or “farther”.

6.6.3.4 The third intervention: the CoreToneVolume
The following exercise is an extended version of sounding the CoreTone, with the focus on performing a crescendo and decrescendo in one single breath. The crescendo starts as quietly as possible reaching a loudness level which feels comfortable, and then turning into a decrescendo of the CoreTone ending with silence. This is accomplished all in one breath.

Description of the exercise:
As in sounding the CoreTone the hands were placed above the chest bone, but in this exercise the client was instructed to think about the hands movement as connected to the loudness level of the CoreTone. The longer the distance to the chest, the louder the CoreTone sounded. The client was instructed to start sounding the CoreTone as quietly as possible, and to allow the CoreTone to grow in volume gradually - getting louder - until reaching a comfortable loudness level, then gradually getting softer again, ending the sound of the CoreTone by having both hands placed above the chest bone. Home - out - home again, all in one breath.

6.6.3.5 The fourth intervention: the Song
The following exercise is about singing a well know song - "Tillukku til tin" also known as "Happy Birthday". I chose a song which I knew was international, but still a song used by our community and country in daily life. Furthermore I chose a song, which had a span of an octave, because it is my clinical experience that the pitch range performed within the song is also affected when suffering from severe depression.

Description of the exercise:
The client was instructed to choose freely between singing the song with or without the words, and to choose a key and loudness level she/he found comfortable. The melody of the song was sung twice. First the client would start by singing the song and I would tune in and sing along with the client in the first round of the melody. In the second round the client would sing alone.

6.6.3.6 The fifth intervention: the Free Improvisation
The voice improvisation is a free improvisation where the client is allowed to let go and play vocally. The voice improvisation is a state of not being limited by any musical rules or themes.

Description of the exercise:
The client was prepared that this intervention may be a challenge, or it may not. To support the client to let go and play vocally she/he was instructed to imagine a space - a private space - she/he found very comfortable, and where the client was doing something she/he enjoyed very much. The client was then instructed to allow her/his own melody to grow out of the sensation of this state. The client was allowed to move around in the room of the music therapy clinic to support this sensation. The client was also permitted to start by giving sound to the CoreTone and then allowing the melody to grow out of this one note. The client decided herself/himself how long she/he would improvise.
Summary of chapter 6

The plan was to collect clinical voice samples from two women and two men diagnosed with depression by carrying out an assessment according to the protocol in the first, seventh and last session. Additionally the plan was to carry out one assessment and collect voice samples from one non-clinical woman and one non-clinical man.

The assessment included five different vocal exercises:

- Sounding and open glissando movement
- Singing a CoreTone
- Singing the CoreTone Volume
- Singing a song (Happy Birthday)
- Performing a vocal improvisation

All in all this should have provided me with 60 clinical sound samples for further assessment and analysis, and 10 non-clinical sound samples.

However, I made a few mistakes in the first session when collecting the data of two clients. In two situations I neglected to ask the client to sing the song, and in one case I neglected to ask the client to sing the Core-Tone alone. So I ended up with 57 clinical sound samples for further assessment and analysis in chapter 7 and chapter 8. This did not have consequences for the first tryout of the VOIAS where the focus was on testing how applicable VOIAS was, and what constitutes a valid and reliable voice assessment tool as well as the inter-reliability. It had a minor consequence when studying if the VOIAS could be used to evaluate change over time. This will be further described in connection with the analysis carried out in both chapters 7 and 8.

During the treatment of two out of four clients I was ill and had almost three months of sick leave from work. This caused disturbance to the therapeutic treatment process. In chapter 8 it will be described in more detail how this had an effect on the therapeutic process. To one client the therapeutic process was suspended just before I had to carry out the second assessment, and in the second case I had just done the second assessment.

However, the sick leave did not have any effect on testing if the VOIAS profile was applicable nor on testing its interreliability.
It is my clinical, teaching and personal experience that the exploration of cracks, holes and broken sounds very often can reveal something new or hidden.

Sanne Storm
The outline of this chapter consists of two parts. The first part (chapter 7.1) comprises the considerations and construction of the voice assessment profile (VOIAS). The VOIAS profile as a whole consists of both a subjective approach of assessing/evaluating vocal sound samples/vocal data collected in chapter 6, VOIAS-1, and an objective approach, VOIAS-2. The considerations and the choice of vocal parameters for both the subjective and the objective approach of assessment and evaluation will be described in detail in chapter 7.1.

Five different vocal interventions were chosen (see chapter 6.6) in order to cover how the human voice generally is employed within music therapy. The design of the VOIAS profile therefore in both the subjective and objective approach of assessment and evaluation includes five different assessment sheets, one sheet connected to each vocal intervention. Validity and reliability issues were taken into consideration when designing the VOIAS profile and the manual as a whole.

This was done in order to support a systematic and consistent evaluation. The first tryout of carrying out the subjective assessment/evaluation is based on an intuitive function of listening and perceiving (see chapter 4.8.2). The considerations of constructing and designing VOIAS-1 will be described in detail in chapter 7.1. The objective approach of assessment and evaluation is based on a psycho-acoustically approach. The considerations and possibilities of constructing and designing this approach will be described in detail in chapter 8.

The second part of this chapter constitutes the examination of the first tryout of the subjective approach of assessment. As described in chapter 3 the design of the examination can be defined as an Explorative sequential design, representing a two-phase mixed methods design, with unequal priority given to the quantitative and qualitative analysis (see figure 1).

Figure 1: The comprehension of the two phase mixed methods design of the first tryout. The upper line is phase 1, the quantitative part, and the line below is phase 2, the qualitative part.
In phase 1 (chapter 7.2) quantitative data were collected from three independent music therapists applying VOIAS-1 in a first tryout for assessing the 87 sound samples collected in chapter 6. A statistic analysis (chapter 7.3) is carried out in order to examine the interrater / assessor agreement, as well as the possibility of utilising VOIAS-1 to evaluate change over time. In phase 2 (chapter 7.4) a follow-up interview of the three music therapists was planned and carried out. This was performed in order to broaden my knowledge and understanding about the function of VOIAS-1 in practice, as well as its potentials and limitations. The interview underwent a phenomenological based meaning condensation (chapter 7.5).

7.1 The design of the Voice Assessment Profile

The design and construction of VOIAS was based on the different vocal parameters identified by looking into existing literature (chapter 2) and my own approach and working method (chapter 4). As mentioned in chapter 6 the aim was to construct a general model of a voice assessment profile (VOIAS) focusing on the human voice within music therapy, and not fixed to a certain working method.

In the selection of the different parameters it was taken into consideration that research reviewed in chapter 2 concluded that only a limited number of acoustic cues have been studied. Furthermore it was concluded that the arousal differences, the underlying emotions within the basic emotion have been neglected (Scherer 2003). Additionally it was concluded that it was necessary for researchers to reach beyond single measures of the most common voice cues, such as the speech rate, fundamental frequency and voice intensity (Juslin and Scherer 2005).

7.1.1 Considerations for the construction of the Likert scale

When constructing VOIAS-1 considerations also concerned how the profile could be validated. The employment of a Likert scale would support an equality to the design of the profile and ensure the possibility of validating the profile with a statistic analysis. The Likert scale is very widely used (Robson 2002) and additionally offers a possibility of the subjective evaluation to follow a systematic procedure as well as being as adequate as possible.

VOIAS is emergent and therefore it was concluded that the first step would be to extract vocal parameters from the literature review and my own working method, and then explore whether they could be evaluated quantitatively by employing a Likert-scale or a psychoacoustic analysis. Additionally, the primary focus of VOIAS-1 was to explore the inter-reliability and validity, therefore the possibility of adding subjective descriptions was left out.

When constructing the Likert scale it was considered whether the parameters to be measured were to be classified into one, two or three directional categories (Kumar 2010). As mentioned in the review of Bruscia’s IAP, the five gradients or levels in his profiles, ranging from one extreme or polarity to its opposite to evaluate each parameter, is in the style of a Likert scale, and could be categorised as three directional. This has proven to be both useful and easy to use. In this study the nature of the vocal parameters determined the type of Likert scale and could be categorised as three directional.

Furthermore the question whether the Likert scale should have three or five gradients was considered. Fewer gradients may ensure the inter-reliability whereas an evaluation with a five gradient scale or higher may be more differentiated and accurate according to the parameter evaluated. Fewer choices are easier to use, whereas the more choices the more complicated and time consuming.

The Likert scale in this study is a five gradient scale, assigning the values from one to five with the three assigned to a general balanced position of the human voice. Gradient one, three and five were defined and described relative to how they should be approached in a developed manual for assessing and evaluating the human voice with VOIAS-1 (see appendix 11: The manual for VOIAS-1). All the selected parameters, except the parameters pitch range and pitch (fundamental
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Table 1: The vocal parameters deduced from the literature review and “Psychodynamic Voice Therapy” as a research method.
frequency), were evaluated according to the developed Likert scale.

The selection of the vocal parameters was as mentioned before based on the vocal parameter identified and extracted from the literature review and my own approach and working method Psychodynamic Voice Therapy (see table 1). In chapter 6 five vocal interventions were chosen in order to cover how the human voice generally is employed within music therapy. These vocal interventions have directed the selection of the vocal parameters for constructing the VOIAS profile as a whole. Some parameters were possible to assess and evaluate both subjectively and objectively, whereas others were only possible to approach either subjectively or objectively (psycho-acoustically). In each single vocal intervention it will be clarified and summed up which parameters were selected for the construction of the VOIAS profile as a whole. It will furthermore be clarified which parameters were selected for the subjective approach for assessment and evaluation (VOIAS-1) and which were selected for the psycho-acoustically analysis carried out in chapter 8 (VOIAS-2).

### 7.1.2 Vocal parameters selected for the assessment of the open sounding glissando movement

The first vocal intervention is the open sounding glissando movement, defined and described in chapter 4.7.1.3. The open glissando movement consists of an ascending and a descending glissando movement divided by breathing in. The focus was to study how a client spontaneously expresses vocally the open sounding glissando movement having in mind what perspectives are relevant based on the clinical experience with treating depression.

The importance of pitch range is acknowledged across disciplines and professions, and is also among the parameters given most attention within music therapy (see Table 1). Both Austin (chapter 2.5.1) and Moses (chapter 2.7) explain how a substantial amount is revealed about the client’s emotional and psychological state through the musical elements in the voice. According to Moses the vocal range is “the language of emotions”.

A calculation of the pitch range of this exercise can be done in both the ascending and descending glissando movement. This means that the lowest and the highest pitch in both the ascending and descending glissando movement must be recorded. This is possible to carry out both subjectively and in a psychoacoustic analysis.

From my clinical experience I have found that it is important to pay some attention towards how the maximum pitch in the descending glissando movement is related to the maximum pitch in the ascending glissando movement.

It is furthermore my clinical experience that how the “letting go” is performed in the ascending glissando movement also provides a significant amount of information. Therefore another possible parameter in the evaluation of the glissando is the ending pitch of the ascending glissando movement.

The instruction of the glissando dictates that it is carried out in a smooth, flowing motion without breaks between the notes. Furthermore the open sounding glissando movement as a whole involves 3 steps carried out as a whole fluently:

1. sounding an ascending glissando movement
2. breathing in
3. sounding a descending glissando movement

Therefore a parameter to evaluate in this exercise also concerned evaluating the flow and the fluency of how the exercise is performed. This parameter can only be evaluated subjectively.

In the literature some attention is given to the duration of breathing and sounding, because it is closely related to emotions. In the open sounding glissando movement this can be calculated by studying above defined and mentioned three steps psycho-acoustically.
7.1.2.1 Parameters considered, but excluded from the VOIAS profile

It is my clinical, teaching and personal experience that the exploration of cracks, holes and broken sounds very often can reveal something new or hidden. This could entail unknown resources or an authentic expression of the Self. But it could also be hidden or bounded feelings of the person vocalising (Newham 1997, Braggins 2005). Listening to and evaluating this parameter is primarily connected to the theoretical foundation of my working method “Psychodynamic Voice Therapy”.

The assessment of the cracks, holes and broken sounds is followed by a therapeutic decision. The therapeutic decision of going into these cracks and holes is crucial for the outcome of the therapy, and it has to be taken into consideration how many resources the client has at the moment in time, and what the primary needs of the client are. Therefore the cracks, holes and broken sounds are important information or guidance in order to understand the client and the client’s state of being from another perspective at the time of making the assessment. However, it was not possible to measure or calculate this neither subjectively nor psycho-acoustically since the cracks, holes and broken sounds most often emerge in the moment while exploring the glissando exercise. Although a pitch contour can be pictured and read in the psycho-acoustic analysis, it is my experience that it is too unreliable to study the pitch contour in order to capture the cracks, holes and broken sounds of the performance of the glissando movement. As such, this parameter is not analysed.

_In summary_, the vocal parameters included in VOIAS-1 therefore were as follows:

- **pitch range**, ending pitch of the ascending glissando movement and fluency.

In summary, the following four parameters were included in the psychoacoustic analysis undertaken in chapter 8:

- **calculating the pitch range**
- **calculating maximum pitch reached in the ascending glissando with maximum pitch reached when starting the descending glissando**
- **the ending of the ascending glissando**
- **time based analysis of the open sounding glissando movement as a whole, including the duration of sounding and breathing**

7.1.3 Vocal parameters selected for the assessment of the **CoreTone** and **CoreToneVolume**

Of all the parameters identified in the literature review _pitch_ (the fundamental frequency) and _intensity_ were the parameters studied and analysed the most within research on speech and affective disorders. Like the pitch range the importance of the parameters _pitch_ (fundamental frequency) and _intensity_ is acknowledged across disciplines and professions, and is also (as summarised in chapter 2) one of the parameters given most attention within music therapy.

The literature review furthermore revealed that the emotional state can be revealed in how the voice is used in speech and singing by studying the _pitch contour_, and the _duration_ of various syllables, and the _overtones_ (formant structure and spectrum) of different vowels and in other aspects of speech. In music therapy Austin, Sokolov and myself give some attention to the parameter _body placement_. Body placement is connected to a way of listening, working and understanding how singing can benefit the state of being as a whole. Connected to the parameter _body placement_ are parameters like _resonance_ - _body resonance / vibration of a tone (overtones / spectrum)_ and _timbre_ (vocal quality). All three of us approach this with the understanding that blocked or bounded emotions may keep the voice in the body.

Therefore the first two selected parameters to record are _pitch_ (the fundamental frequency)
and intensity. In the vocal intervention CoreToneVolume the exploration of the intensity (volume / loudness) is the focus of the exercise. Still it is an important parameter to evaluate in both cases. In the performance of the CoreTone exercise the level of volume or intensity of the tone is a spontaneous choice, whereas the volume and intensity in the CoreToneVolume exercise is more consciously chosen, and part of an exploration of the parameter itself. Pitch and intensity (volume) can be recorded and measured both subjectively and in a psychoacoustic analysis. The overtones (spectrum and formant structure) can be examined psycho-acoustically, and approached subjectively by evaluating if the voice is more or less resonant (rich).

The vocal quality or timbre is another important parameter addressed across disciplines. It is also a parameter difficult to grasp and evaluate or measure. The literature review has shown that parts of the vocal quality can be approached. Presently neither qualitative nor quantitative methods exist that capture the vocal quality as a whole. Howard, an experienced researcher within voice and psychoacoustics from the University of York, United Kingdom, concludes:

“Timbre is a subjective aspect of sound for which there is no such scale and neither qualitative nor quantitative descriptions are generally found that are widely accepted.”

(Howard 1997, pp 65)

This view is supported by Colton, Casper, and Leonard, all professors within otolaryngology and communication sciences:

“Many adjectives are used to describe voice quality, but they are difficult to quantify, and no widespread agreement exists on the meanings of voice quality terms.”

(Colton, Casper, Leonard 2006, pp 266)

The parameter quality/timbre is a more complicated parameter to approach and evaluate adequately. The literature review supports that the quality or colour of the sound produced projects the emotional content into the sound. In other words it constitutes the quality of the sound containing the code for the emotional content. As presented in my own clinical approach (chapter 4.8) I have worked out a method for listening to a spatial body sensation which partly also addresses the quality of the sound. How I employed this in VOIAS-1 will be described in further detail in chapter 7.6. Psycho-acoustically the vocal quality was addressed by studying the formant structure, the spectrum and the spectral centroid.

In accordance with Austin (2002), it is my clinical experience that needs and feelings remained unmet and may be connected to inaudible, tight and tense, breathy and undefined voices. Furthermore Austin points out that a traumatised person often survives by forfeiting her/his own voice. Put in another way, the voice will not appear physically, emotionally and psychologically embodied.

Therefore the parameters tension and breathy, as well as the ability to sustain a sound with more or less constancy (fluctuation) was also selected for VOIAS-1. At the time when I was examining the different psychoacoustic possibilities of analysing the human voice I did not completely understand what the psychoacoustic analysis of the parameter fluctuation could provide of clinical information about the client 2). Thus the parameter fluctuation was not selected to be a part of the psychoacoustic analysis.

In the literature review some attention also was paid to the duration of the breathing and sounding, and how duration may be affected according to different emotions. This parameter was measured psycho-acoustically.

7.1.3.1 Parameters considered, but excluded from the VOIAS profile

According to the literature within speech and communication of emotions in general, it is also suggested to look into psychoacoustic parameters like fundamental frequency variability and fundamental frequency mean floor. Having in mind that the VOIAS profile

2) I went to Centre of Excellence, Department of Music, University of Jyväskylä, Finland to examine the psychoacoustic possibilities of vocal assessment. There I made choices and selected different vocal parameters, which were analysed by Professor Tuomas Eerola with the MIRtoolbox. This will be described in more detail in chapter 8.
is emergent, the first step was to look into the fundamental frequency which in the subjective approach would be defining the pitch. At the time of selecting the different parameters it seemed too comprehensive to explore the fundamental frequency in more detail psycho-acoustically.

Different other parameters were mentioned in the literature like pitch control, pitch accuracy, and intonation. However, in this context these parameters focused more on the clients’ musicality rather than on their human voice. It could be discussed that these parameters also could support an evaluation and psychological interpretation that a client is nervous or with low self-esteem. But studying the parameters intensity (volume) and pitch range I found that these parameters were covered by focusing on intensity (volume), fluctuation and pitch range and by comparing the outcome from these parameters. The consideration in developing VOIAS-1 was furthermore to have a profile not to overwhelming and comprehensive, but with selected vocal parameters easy to handle and evaluate.

In summary, the vocal parameters included in VOIAS-1 were as follows: pitch (fundamental frequency), loudness, richness, tension versus breathy, fluctuation and quality (timbre) in relation to a spatial body sensation, either horizontal or vertical.

In summary, the vocal parameters included in the psychoacoustic analysis undertaken in chapter 8 were the following six parameters:

- fundamental frequency/Hz (pitch)
- spectrum
- spectrum centroid
- formant contours
- intensity - loudness
- duration of the sounding.

7.1.4 Vocal parameters selected for the assessment of the Song

The parameters extracted and selected for evaluating the song with the VOIAS profile were almost the same as for the CoreTone and CoreToneVolume, except for the parameter pitch, which is excluded from VOIAS-1. At the time VOIAS-1 was constructed, the starting pitch of the song was not approached as a variation of sounding the CoreTone - the fundamental frequency. Later when carrying out the psychoacoustic analysis the starting pitch was included in the measurement to explore if this was a possible approach. This was also the reason why spectrum was left out and only spectral centroid were included in the psychoacoustic analysis. This will be explained in more detail in chapter 8.

7.1.4.1 Parameters considered, but excluded from the VOIAS profile

Among different parameters the duration of the breathing and sounding were also considered, as well as the tempo of the song, because the literature review points to these parameters as being affected by emotional state of being. However, at the time when the psychoacoustic analysis was carried out it was found far too complicated to approach.

It was furthermore considered to explore how the span (ambitus) of the song was accomplished or handled. This parameter might have been comparable with how the client was able to lift the start of the descending glissando. Nevertheless this parameter was excluded because it started to be mixed up with musical expectations of being able to sing in tune, and this is not the focus as mentioned earlier.

In summary, the vocal parameters included in VOIAS-1 were as follows: loudness, richness, tension versus breathy, fluctuation and quality (timbre) in relation to a spatial body sensation, either horizontal or vertical.

In summary, the vocal parameters included in the psychoacoustic analysis undertaken in chapter 8 were the following four parameters:

- measuring the starting pitch / mean frequency of the first tone in the song
- spectral centroid
- the intensity - loudness of the song
- the formant contours of the song

7.1.5 Vocal parameters selected for the assessment of the Vocal improvisation

In principle it makes no difference whether the client sings one single tone or the client sings a vocal improvisation. The focus is still
on the human voice. Therefore many of the parameters are also the same as mentioned above. However because it is an improvisation, a vocal expression happening over time, the parameters sometimes need to be addressed differently.

Within the vocal improvisation the pitch range is studied and explored by evaluating the span of pitches spontaneously applied during the vocal improvisation. This span of pitches can be very wide or very narrow. The parameter starting pitch was excluded from the VOIAS-1 for the same reasons as mentioned for the assessment of the Song. Later when carrying out the psychoacoustic analysis the starting pitch was included in the measurement to explore if this was a possible approach. This will be explained in more detail in chapter 8.

Vocal parameters like loudness, richness, tension versus breathy, and quality (timbre) mentioned above were also selected for assessing the vocal improvisation. However the parameters are approached slightly differently by intuitively scoring the experience of a mean value of the parameters of how the vocal improvisation is experienced performed as a whole. The vocal parameters like the pitch contour, the duration of sounding and breathing, as well as the overtones (formant structure) also mentioned above were also included in analysing the vocal improvisation psycho-acoustically.

Three new parameters were added for subjectively assessing and evaluating the vocal improvisation. The parameter form and structure was added in order to evaluate how fluent and free the improvisation appeared. Secondly the parameter dynamics was added in order to evaluate the felt experience of the energy, power and force, the forms of vitality as defined by Stern (2010). Finally, the parameter fluency of breathing and sounding during the vocal improvisation was added.

7.1.5.1 Parameters considered, but excluded from the VOIAS profile
In the psychoacoustic analysis the intensity / loudness variability of the voice during the improvisation was excluded because the participants walked around in the music therapy room, and did not stand with approximately the same distance to the microphone as in the premier exercises. Although the parameter spectrum centroid was included in the psychoacoustic analysis of the vocal intervention song, it is excluded in the vocal improvisation because it was more difficult to chose one single tone in order to study this parameters.

In summary, the vocal parameters included in VOIAS-1 were as follows: pitch range, mean loudness, mean richness, mean tension versus breathy, flexibility in form and structure, dynamics, fluency and quality (timbre) in relation to a spatial body sensation, either horizontal or vertical.

In summary, the vocal parameters included in the psychoacoustic analysis undertaken in chapter 8 were the following six parameters:

- measuring the fundamental frequency of the first tone in the voice improvisation
- calculating the pitch range in the improvisation
- a time based analysis of the free voice improvisation
- the sounding and breathing durations in the improvisation
- studying the pitch contour of the improvisation
- studying the formant contours of the improvisation

7.1.6. The vocal parameter: quality (timbre)
As summarised in chapter 4, chapter 4.6.3, the vocal quality is closely connected to the emotional state and contains the code for the emotions in play. Therefore I found it important to try to find a way of evaluating the quality of the voice in a way that may guide the direction of psychological interpretation.

So far it had been possible to construct a Likert scale in connection with each chosen vocal parameter. However, trying to capture the emotional sensation within the voice quality was a different task.
7.1.6.1 Tryout: Voice quality and descriptors

Daniel Boone has developed a whole section of adjectives to be used in the evaluation of the human voice within the field of speech therapy (see appendix 8) (Boone 1991). The first tryout to find a method to describe and quantify the evaluation of the voice quality was to bring this list of adjectives to the PhD group along with a list of musical descriptors (see appendix 9). Different voice samples were brought to be evaluated performing three different vocal exercises each: the glissando movement, the CoreTone and the song.

A sheet was developed containing three columns (see appendix 10) where it was possible to write subjective spontaneous descriptors and select words from either the list of adjectives (Boone’s list) or the list of musical descriptors.

It turned out that the most used column was the one with the possibility of writing subjective spontaneous descriptors. The feedback was that it was challenging to both read, select words and connect descriptive words to the voice sample heard. The musical descriptor list was no success at all. The Boone-list was used in between, but studying the words chosen it turned out that very different words were used to describe the same voice sample. The best result of this pilot turned out to be the individual informant’s possibility of writing the adjectives or substantives that spontaneously popped up in connection with the sound heard. These words turned out to be much closer to being a description of the client story, whereas words chosen from both Boone’s list and the list of musical descriptors turned out to not to capture the emotional content and story of the client. It furthermore turned out that many used the same words or synonyms in connection with the same sound sample.

3) Daniel R. Boone is a Professor Emeritus in the Department of Speech and Hearing Sciences at the University of Arizona. The treatment of voice disorders has been his specialty for over 45 years. Boone has written several voice books and developed several voice therapy programs, which are used not only in the United States, but throughout the world.

7.1.6.2 Pilot study: Listening to a spatial body sensation

The next step was an attempt to listen to a spatial body sensation with the PhD group, after introducing my own way of sensing and feeling the form of a vocal sound. A sheet (see figure 2) was worked out illustrating the six different spatial body sensations following the listening principles described in chapter 4.9.2.2. In each circle there was a dashed line marking five gradients in the front and the back into a Likert-scale.

The result of this pilot clarified that the listening was still too spread out among the listeners when applying Boone’s list of adjectives and the list of musical descriptors. Therefore descriptors available for evaluating the sound quality of the voice were finally given up.

Figure 2: First draft of a spatial body sensation model. It was combined with Boone’s list of adjectives and a reduced list of musical descriptors (see Appendix 8 and 9) in order to see if this combination could work.
After this tryout I felt challenged, and had many thoughts about either giving up finding a way to evaluate the voice quality in a quantified way or trying once more. After discussing the purpose of working out a method for evaluating the sound quality of the voice with both my supervisors, it was clarified that the most essential information to collect and be able to evaluate in a quantified way, was the question regarding if the sound of the client implied that the client was grounded or not. This was based on the fact that the basic aim of the body and vocal exercises was to support a grounding and a more subtle sensation of body and Self. The last tryout therefore only consisted of four different spatial body sensations, one in the head, the throat and two in the body, a chest and pelvis placement (see figure 3).

This tryout of placing a spatial body sensation seemed promising (see figure 4).

The picture shows that there seemed to be better inter-reliability when placing a sound either above the throat or below the throat, but difficulties in placing the sound quality
either in the chest or pelvis region of the body. The picture also illustrates how it seemed easier to evaluate one single tone instead of a vocal improvisation.

However the placement of a spatial body sensation ended up even more simplified on the VOIAS sheet. This parameter ended up only focusing on three spaces, the head, the throat and the body, and the body figure was deleted and a Likert scale simplifying the graduation of the horizontal spatial body sensation was constructed into the following figure (see figure 5 and 6). This Likert scale is a five gradient scale, assigning the values from one to five with the three assigned to a general balanced and centring position of the human voice.

**Summing up the VOIAS profile**

In chapter 7.1 vocal parameters were extracted from the literature review and my own approach and working method and selected for the VOIAS profile as a whole. The VOIAS profile consists of both a subjective approach of assessment and evaluation of the human voice, VOIAS-1, and an objective approach, VOIAS-2. The five vocal interventions chosen in chapter 6 have directed the selection of the vocal parameters for constructing the VOIAS profile.

In VOIAS-1 the vocal parameters are approached subjectively, and the vocal parameters are assessed and evaluated according to a developed Likert scale, except for pitch and pitch range. The Likert scale is a five gradient scale, assigning the values from one to five with the three assigned to a general balanced position of the human voice. Gradient one, three and five are defined and described relative to how they should be approached in the developed manual for VOIAS-1. Finally an evaluation and assessment sheet with the selected vocal parameters connected to each vocal intervention is designed and constructed. In the manual for assessing and evaluating the human voice with VOIAS-1 each vocal intervention is also defined and described. Appendix 11 and
appendix for chapter 7, USB-memorystick consist of the manual for VOIAS-1 and the VOIAS-1 assessment sheets. In the following it will be described how VOIAS-1 is tried out.

In VOIAS-2 the vocal parameters are approached objectively and analysed psycho-acoustically. A manual for approaching the analysis psycho-acoustically is developed and described in detail in chapter 8.

7.2 Collecting quantitative data from the first tryout with VOIAS-1
In chapter 7.1 VOIAS-1 was designed and constructed, and consists of a manual and five assessment sheets, one assessment sheet for each vocal intervention. As described in chapter 6, 87 sound samples were collected by employing the vocal assessment protocol developed. The sound samples contained 57 sound samples collected from two men and two women suffering from depression, as well as 10 sound-files from one non-clinical man and woman. In other words, a main part of the sound samples was collected from clinical practice.

Three music therapists were recruited to try out VOIAS-1 for the first time, and evaluate the 87 sound samples by employing the constructed assessment sheets and by following the developed manual (VOIAS-1). In this first tryout quantitative data as well as qualitative data were collected. In the following it will be described how the quantitative data was collected, and how the three independent music therapists were recruited along with the ethical and confidentiality concerns. The collection of the qualitative data is described in detail in chapter 7.4.

7.2.1 The design and the methodology of collecting the quantitative data
As mentioned above, 57 voice samples were collected from two women and two men suffering from depression by applying the developed assessment protocol in the first, seventh and twelfth session in a music therapeutic treatment based on Psychodynamic Voice Therapy. As there were three different sound samples for each intervention from each client, and only one sound sample for each intervention form the non-clinical woman and man, it was decided to add the same sound file three times. This meant that the assessors would assess the same sound file three times.

In order to have each sound sample collected from clinical practice to appear randomised according to the therapeutic process, all 87 sound samples were pooled. In this way the potentials of VOIAS-1 to evaluate change over time could be validated. In addition, the three music therapists inter-rater agreement on measuring possible changes over time according to each specific vocal parameter and each individual client could also be examined.

It is for looking into details, in individual responses, that the assessment tool will be primarily designed, and it is the results from this detailed analysis which will determine if the pooled data reveal something significant clinically and statistically.

7.2.2 The recruitment of three independent music therapists
Taking into consideration that this was a first tryout of VOIAS-1, and that it is a profile in working progress, which might still be in need of changes, a small sample of music therapists was chosen to test the VOIAS-profile.

The criteria for recruiting the independent music therapists were that they:

- had not tried out any part of my assessment tool beforehand
- had no knowledge whatsoever about my approach and working method
- had some years of working experience
- represented both men and women
- represented psychiatry to some extent
- had the experience of being part of and working in an interdisciplinary team.

Though the sample of independent music therapists is small, I still found it important that experiences of the first tryout of the
VOIAS-profile were represented by both a man and a woman. It was important that the three independent music therapists to some extent represented different working areas, but still with experience from collaboration with other disciplines. It is important to bear in mind that the purpose of the VOIAS profile was to support the communication of important observations in a way which can be easily understood, and where the psychological interpretations will make sense to the interdisciplinary team, and at the same time clarify how and what musical events supported this therapeutic process.

7.2.3 A concise description of the three independent music therapists recruited
All three music therapists were trained at Aalborg University, and had not tried out my assessment tool or heard any of my presentations about my study. Additionally, none of them had further training within voice work. The man had working experience in psychiatry, but for years worked full time in private practice, and had teaching experience as well. The two women worked in a psychiatric hospital, and had several years of working and teaching experience.

7.2.3.1 My relation to the three independent music therapists
I know the three music therapists personally, which is quite inevitable, since the Danish music therapy association is as small as it is. But I do not know any of the music therapists very well, and have not worked together with any of them. I did not find it problematic that I knew them beforehand. I knew the two women a bit more than the man, and have met them at conferences and teaching settings. It is important to be aware of the power issues (Kvale & Brinkmann 2009). I mostly found this balanced because all of us have years of working experience and also share a strong interest in developing music therapy in psychiatry. What I experienced as most stressful was that they all were very busy music therapists and as such I felt humble about occupying their time, when it turned out that they all had to use much more time than I first calculated.

7.2.4 How the three music therapists were prepared
The three independent music therapists were informed about the purpose of tryout, and about what equipment was needed for them to carry out the first tryout of VOIAS-1 (see table 2).

In order to carry out the assessment and evaluation I brought the three music therapists:

1) Headphones AKG K271.

2) A CD containing the 87 collected sound samples representing four clients suffering from depression, and two non-clients.

3) A developed manual for VOIAS-1.

4) A folder containing a printed VOIAS-1 assessment-sheet for each sound-file.

The manual of VOIAS-1 consisted of 1) a short definition and description of each of the five vocal exercises, followed by a description of how to approach the assessment and evaluation of each vocal parameter connected to each vocal exercise, 2) a short video demonstrating the vocal exercises Glissando, CoreTone, and CoreToneVolume, and 3) a sound file demonstrating one vocal parameter, Body.

Right after the three music therapists had performed the first tryout of VOIAS-1 a follow-up interview was carried out. The three interviewees were beforehand informed about this follow-up interview and given a
detailed sequence of 15 carefully worded questions addressing different themes of the VOIAS profile (see table 20, chapter 7.4.1.3). The music therapists could freely decide how detailed they would like to have prepared the answers for the interview. The follow-up interviews were qualitative data. How these data were collected will be described in chapter 7.4.

7.2.5 The ethical and confidentiality concerns
Confidentiality in research implies that private data identifying the participants will not be disclosed. The principle of the research participants’ right to privacy is not without ethical and scientific dilemmas. Qualitative methods such as interviews involve different ethical issues and questionnaire surveys, where confidentiality is assured by the computed averages of survey responses. Precautions need to be taken to protect the participants’ privacy.
Anonymity can protect the participants, but it can also deny them “the very voice in the research that might originally have been claimed as its aim” (Parker 2005, in Kvale & Brinkmann 2009). We should also note that in some cases interviewees, who have spent their time and provided valuable information to the researcher, might wish, as in a journalistic interview, to be credited with their full name.
The music therapy environment in Denmark is rather small, and it can be difficult to guarantee anonymity. Basically each interviewee was anonymous, and was told that the recording was going to be transcribed and analysed.
The ethical requirements of the researcher also included a strict adherence to the scientific quality of the knowledge published. This involves publishing findings that are as accurate and representative of the field of inquiry as possible. The results reported should be checked and validated as fully as possible, with an effort towards creating a transparency of the procedures by which the conclusions have been arrived at: integrity of the researcher, his or her sensitivity and commitment to moral issues and action (Kvale & Brinkmann 2009).
7.3 A statistical examination of VOIAS-1

Quantitative data were collected from three independent music therapists using VOIAS-1 in a first tryout for assessing the 87 sound samples collected as described in chapter 6. In this section an examination of the interrater / assessor agreement, as well as the possibility of VOIAS-1 to evaluate change over time is carried out. In doing so the scorings of the three music therapists were subject to a statistical analysis performed by my fellow PhD student Melody Schwantes.

7.3.1 Methodology for the statistical analysis of the VOIAS-1

All data were entered into SPSS for each client at each time-point (first assessment, second assessment, and last assessment) with each individual rater’s scores. There were a total of 18 items for each client. Missing data were found for client’s AB and BC on CT and SO for the first assessment. For a conservative replacement of data, data from each corresponding raters in the second assessment were used.

Each subscale within the VOIAS-1 was added (GLI, CT, CTV, SO and IMP) to generate a total score of the subscale and then for the assessment as a whole. Each client therefore had 4 total scores (one for each rater) on the VOIAS-1. The parameter Body was left out of the overall score as it was calculated separately due to high discrepancies.

The data were then used to determine the objectives: 1) assess change over time and 2) inter-rater reliability among raters at three time points. Each of these is presented in the Results.

Pearson’s correlation was used to measure inter-rater reliability. The guidelines to interpreting Pearson’s Correlation coefficient propose the following: a high correlation has a $\rho$ values between -0.5 to 1.0. A medium correlation has a $\rho$ values between -0.3 to -0.5, and a low correlation has a $\rho$ values between -0.1 to -0.3. Each of the rater’s scores across clients were complied together, and a Pearson Correlation was run on these total scores by rater.

Looking through the data collection of the three music therapist’s subjective evaluation, it was my experience that the vocal parameter Body was evaluated with more differences than the other parameters. Furthermore did the follow-up interview reveal that this parameter was experienced the most difficult parameter to approach (see chapter 7.5). Therefore the Body-parameter for each of the 4 subscales (CT, CTV, SO, IMP) was extracted, and each rater’s scores on each of the 4 clients were added together, and a Spearman’s Correlation was run on the total scores by rater. A Spearman’s rank-order correlation is the nonparametric version of the Pearson Correlation. A Spearman’s Correlation is usually applied when interval data has failed the assumptions necessary for conducting the Pearson Correlation.

Finally, a Repeated Measures ANOVA was completed using all of the raters’ scores at each of the three time points and between the first and third time points. Bonferroni’s post hoc analysis was completed to determine where any significant changes might have occurred. Each of these analyses is presented in the results section. The analysis first starts with an overall score of all four clients, followed by each client individually. This analysis provides a global assessment of the VOIAS-1 as well as an individualised assessment of each client to determine a fuller representation of the uses of the VOIAS-1.

4) Melody Schwantes, PhD, MT-BC, defended her PhD 2011 and is now an adjunct professor at Hayes School of Music, Appalachian State University, Director at Scholars with Diverse Abilities, and a music therapist at Joie de vivre music therapy in North Carolina Area, United States.

5) GLI = Glissando, CT = CoreTone, CTV = CoreToneVolume, SO = Song, IMP = Improvisation
7.3.2 The statistical results of the examination of the inter reliability of VOIAS-1

Pearson’s correlation determined that the value of \( \rho \) was between .895 - .978 between each of the raters demonstrating a significantly high correlation and therefore a very small variation of differences in the evaluation of the different sound samples (see table 3).

By studying table 1 more closely it is possible to see how my evaluation (Rater 4) is correlating with each of the three independent music therapists. It turns out that my evaluation has the highest inter reliability with assessor number 2, showing a \( \rho \) value of .957.

7.3.2.1 The statistical results of the examination of the inter reliability of the vocal parameter Body

Spearman’s rank order correlation calculation found a significant negative correlation between Rater 4 and Rater 3. The other correlations were not significant. (See table 4).
7.3.3 The statistical results of examining the possibility of the VOIAS profile to apprehend change over time

Finally a Repeated Measures ANOVA was completed. Means and standard deviations for each of the assessments (first assessment, second assessment, and last assessment) are reported in Table 5 above.

Mauchly’s test was violated, so a Greenhouse-Geisser correction was reported as $F(1.43, 21.50) = 15.13, p < .00$. (see table 6).

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Table 6: Tests of Within-Subjects Effects

A Bonferroni post-hoc analysis determined that from the first assessment to the second assessment there were no significant difference ($p < .17$). However there was a significant difference from the second assessment to the third assessment ($p < .00$). There was also a significant difference from the first assessment to the third assessment ($p < .00$) (see table 7). The Profile

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<td>.000</td>
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</tr>
<tr>
<td></td>
<td>2</td>
<td>6.625*</td>
<td>1.549</td>
<td>.002</td>
<td>2.453</td>
</tr>
</tbody>
</table>

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

* The mean difference is significant at the

Table 7: Pairwise Comparisons
Chapter 7

Plot is picturing the pattern of the process (see figure 7) and it is visible how the process is improving more from the second to the last assessment.

7.3.4 The statistical results of examining the possibility of the VOIAS profile apprehend change over time in each case

In the following each client is examined independently to determine the VOIAS profile’s possibility of apprehending the client’s individual overall changes.

7.3.4.1 The statistical results of the examination of the VOIAS profile’s possibility of evaluating change over time AB

A repeated measures ANOVA indicated that $F(1.02, 3.04) = 3.31, p < .17$ which was not significant (see table 8).

![Figure 7: Estimated Marginal Means of Measure 1](image)

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>factor 1</td>
<td>Sphericity Assumed</td>
<td>444.500</td>
<td>2</td>
<td>222.250</td>
<td>3.305</td>
</tr>
<tr>
<td></td>
<td>Greenhouse-Geisser</td>
<td>444.500</td>
<td>1.015</td>
<td>438.100</td>
<td>3.305</td>
</tr>
<tr>
<td></td>
<td>Huynh-Feldt</td>
<td>444.500</td>
<td>1.037</td>
<td>428.726</td>
<td>3.305</td>
</tr>
<tr>
<td></td>
<td>Lower-bound</td>
<td>444.500</td>
<td>1.000</td>
<td>444.500</td>
<td>3.305</td>
</tr>
<tr>
<td>Error (factor1)</td>
<td>Sphericity Assumed</td>
<td>403.500</td>
<td>6</td>
<td>67.250</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Greenhouse-Geisser</td>
<td>403.500</td>
<td>3.044</td>
<td>132.563</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Huynh-Feldt</td>
<td>403.500</td>
<td>3.110</td>
<td>129.727</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower-bound</td>
<td>403.500</td>
<td>3.000</td>
<td>134.500</td>
<td></td>
</tr>
</tbody>
</table>

Table 8: AB Tests of Within-Subjects Effects
Looking at table 7 (see table 9, AB Pairwise Comparisons, it presents where the significance differences occurred) there is a significance level for differences between the second assessment and the third assessment ($p < .00$), but no significant differences between the first assessment and the second assessment ($p < .83$), the first assessment to the third assessment ($p < 1.00$). Bonferroni’s post hoc analysis indicated that significance only was found between second assessment and third assessment.

<table>
<thead>
<tr>
<th>(I) factor</th>
<th>(J) factor</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.a</th>
<th>95% Confidence Interval for Difference*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>9.250</td>
<td>6.945</td>
<td>.825</td>
<td>-24.478 - 42.978</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>-5.500</td>
<td>7.217</td>
<td>1.000</td>
<td>-40.550 - 29.550</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>-9.250</td>
<td>6.945</td>
<td>.825</td>
<td>-42.978 - 24.478</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>-14.750*</td>
<td>.750</td>
<td>.001</td>
<td>-18.392 - 11.108</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>5.500</td>
<td>7.217</td>
<td>1.000</td>
<td>-29.550 - 40.550</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>14.750*</td>
<td>.750</td>
<td>.001</td>
<td>11.108 - 18.392</td>
</tr>
</tbody>
</table>

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

* The mean difference is significant at the

Table 9: AB Pairwise Comparisons

The Profile Plot (see figure 8) is picturing the pattern of the process as deteriorating from the first assessment to the second assessment, improving from the second assessment to the third assessment, as well as improving from the first assessment to the third assessment.

![Estimated Marginal Means of MEASURE_1](image)

Figure 8: AB Estimated Marginal Means of Measure 1

_In summary_, the ANOVA measures with a Greenhouse-Geisser correction were statistically not significantly between time points $F(1.02, 3.04) = 3.31, p < .17$. Post hoc test using the Bonferroni correction however revealed that the therapeutic process improved significantly from the 2. assessment to the 3. assessment.
Chapter 7

The Profile Plot (see table 10) indicates that the pattern of the therapeutic process could be described as follows:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. assessment</td>
<td>0</td>
</tr>
<tr>
<td>2. assessment</td>
<td>-</td>
</tr>
<tr>
<td>3. assessment</td>
<td>+ significant</td>
</tr>
<tr>
<td>1. assessment - 3. assessment</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 10: AB Improving (+), Deteriorating (-), Neither improving nor deteriorating (0)

The conclusion is that the statistical analysis indicate that three independent music therapists and I measured AB’s therapeutic process to improve with significance from the 2. assessment to the 3. assessment.

7.3.4.2 The statistical results of the examination of the VOIAS profile’s possibility of evaluating change over time BC

The conclusion is that the statistical analysis indicated that three independent music therapists and I measured BC’s therapeutic process to improve with significance from the second assessment to the 3. assessment. In this case it means that the conclusion of the statistical results is that the improvement over time is not significant.

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>factor 1</td>
<td>Sphericity Assumed</td>
<td>658.500</td>
<td>2</td>
<td>329.250</td>
<td>66.966</td>
</tr>
<tr>
<td></td>
<td>Greenhouse-Geisser</td>
<td>658.500</td>
<td>1.317</td>
<td>500.102</td>
<td>66.966</td>
</tr>
<tr>
<td></td>
<td>Huynh-Feldt</td>
<td>658.500</td>
<td>1.941</td>
<td>339.289</td>
<td>66.966</td>
</tr>
<tr>
<td></td>
<td>Lower-bound</td>
<td>658.500</td>
<td>1.000</td>
<td>658.500</td>
<td>66.966</td>
</tr>
<tr>
<td>Error (factor1)</td>
<td>Sphericity Assumed</td>
<td>29.500</td>
<td>6</td>
<td>4.917</td>
<td>4.917</td>
</tr>
<tr>
<td></td>
<td>Greenhouse-Geisser</td>
<td>29.500</td>
<td>3.950</td>
<td>7.468</td>
<td>7.468</td>
</tr>
<tr>
<td></td>
<td>Huynh-Feldt</td>
<td>29.500</td>
<td>5.822</td>
<td>5.067</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower-bound</td>
<td>29.500</td>
<td>3.000</td>
<td>9.833</td>
<td></td>
</tr>
</tbody>
</table>

Table 11: BC Tests of Within-Subjects Effects
Mauchly’s test was violated so a Greenhouse-Geisser correction was reported (see table 11). A repeated measures ANOVA indicated that $F(1.32, 3.95) = 66.97, p < .001.$

Table 12: BC Pairwise Comparisons presents where the significance differences occurred.

<table>
<thead>
<tr>
<th>(I) factor1</th>
<th>(J) factor1</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig. *</th>
<th>95% Confidence Interval for Difference *</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>-13.500 *</td>
<td>1.258</td>
<td>.005</td>
<td>(-19.611, -7.389)</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>-17.250 *</td>
<td>2.056</td>
<td>.011</td>
<td>(-27.238, -7.262)</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>13.500 *</td>
<td>1.258</td>
<td>.005</td>
<td>(7.389, 19.611)</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>-3.750</td>
<td>1.250</td>
<td>.173</td>
<td>(-9.821, 2.321)</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>17.250 *</td>
<td>2.056</td>
<td>.011</td>
<td>(7.262, 27.238)</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>3.750</td>
<td>1.250</td>
<td>.173</td>
<td>(-2.321, 9.821)</td>
</tr>
</tbody>
</table>

Based on estimated marginal means

* The mean difference is significant at the

a. Adjustment for multiple comparisons: Bonferroni.

Table 12: BC Pairwise Comparisons

Looking at table 12: Pairwise Comparisons, Bonferroni’s post hoc analysis determined that there was a significance level for differences between the first assessment and the second assessment ($p < .01$), and between the first assessment and the third assessment ($p < .01$). However, there was no significant difference between the second assessment and the third assessment ($p < .17$).

Figure 9: BC Estimated Marginal Means of Measure 1

---

6) If the p value is .05 or less it is considered significant.
In summary, the ANOVA measures with a Greenhouse-Geisser correction were statistically significantly between time points ($F(1.32, 3.950) = 66.97, p < .001$). Bonferroni’s post hoc test analysis determined a significant difference between the first assessment to the second assessment and from the first assessment to the last assessment, but not between the second assessment and the last assessment.

The Profile Plot (see figure 9 and table 13) indicates that the pattern of the therapeutic process could be described as follows:

<table>
<thead>
<tr>
<th>1. assessment</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. assessment</td>
<td>+ significant</td>
</tr>
<tr>
<td>3. assessment</td>
<td>+</td>
</tr>
<tr>
<td>1. assessment - 3. assessment</td>
<td>+ significant</td>
</tr>
</tbody>
</table>

Table 13: BC Improving (+), Deteriorating (-), Neither improving nor deteriorating (0)

The conclusion is that the statistical analysis indicated that three independent music therapists and the researcher measured BC’s therapeutic process to improve with significance over time.

7.3.4.3 The statistical results of the examination of the VOIAS profile’s possibility of evaluating change over time DC

Mauchly’s test was violated so a Greenhouse-Geisser correction was used (see table 14). A repeated measures ANOVA indicated that $F(1.20, 3.60) = 14.056, p < .023$.

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>factor 1</td>
<td>Sphericity Assumed</td>
<td>491.167</td>
<td>2</td>
<td>245.583</td>
<td>14.056</td>
</tr>
<tr>
<td></td>
<td>Greenhouse-Geisser</td>
<td>491.167</td>
<td>1.200</td>
<td>409.336</td>
<td>14.056</td>
</tr>
<tr>
<td></td>
<td>Huynh-Feldt</td>
<td>491.167</td>
<td>1.555</td>
<td>315.805</td>
<td>14.056</td>
</tr>
<tr>
<td></td>
<td>Lower-bound</td>
<td>491.167</td>
<td>1.000</td>
<td>491.167</td>
<td>14.056</td>
</tr>
<tr>
<td>Error (factor 1)</td>
<td>Sphericity Assumed</td>
<td>104.833</td>
<td>6</td>
<td>17.472</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Greenhouse-Geisser</td>
<td>104.833</td>
<td>3.600</td>
<td>29.123</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Huynh-Feldt</td>
<td>104.833</td>
<td>4.666</td>
<td>22.468</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower-bound</td>
<td>104.833</td>
<td>3.000</td>
<td>34.944</td>
<td></td>
</tr>
</tbody>
</table>

Table 14: DC Tests of Within-Subjects Effects

Looking at table 15: Pairwise Comparisons Bonferroni’s post hoc analysis determined that there was a significant difference between the first assessment and the second assessment. However, no significance was found between the second assessment and the third assessment, and between the first assessment and the third assessment.
In summary, the ANOVA measures with a Greenhouse-Geisser correction were statistically significantly between time points $F(1.20, 3.60) = 14.056, p < .023$. Bonferroni’s post hoc test analysis determined a significant difference between the first assessment to the second assessment and from the first assessment to the last assessment, but not between the second assessment and the last assessment.

![Figure 10: DC Estimated Marginal Means of Measure 1](image)

Table 15: DC Pairwise Comparisons

<table>
<thead>
<tr>
<th>(I) factor 1</th>
<th>(J) factor 1</th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval for Differencea</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>-9.750</td>
<td>1.797</td>
<td>.037</td>
<td>-18.477 -1.023</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>-15.500</td>
<td>3.926</td>
<td>.087</td>
<td>-34.569 3.569</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>9.750</td>
<td>1.797</td>
<td>.037</td>
<td>1.023 18.477</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>-5.750</td>
<td>2.750</td>
<td>.383</td>
<td>-19.106 7.606</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5.750</td>
<td>2.750</td>
<td>.383</td>
<td>-7.606 19.106</td>
</tr>
</tbody>
</table>

Based on estimated marginal means

* The mean difference is significant at the

a. Adjustment for multiple comparisons: Bonferroni.
Chapter 7

The Profile Plot (see figure 10 and table 16) indicates that the pattern of the therapeutic process could be described as follows:

<table>
<thead>
<tr>
<th>1. assessment</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. assessment</td>
<td>+ significant</td>
</tr>
<tr>
<td>3. assessment</td>
<td>+</td>
</tr>
<tr>
<td>1. assessment - 3. assessment</td>
<td>+ significant</td>
</tr>
</tbody>
</table>

Table 16: DC Improving (+), Deteriorating (-), Neither improving nor deteriorating (0)

The conclusion is that the statistical analysis indicated that three independent music therapists and the researcher measured DC’s therapeutic process to improve with significance over time.

7.3.4.4 The statistical results of the examination of the VOIAS profile’s possibility of evaluating change over time BD

Mauchly’s test was violated. A repeated measures ANOVA with a Greenhouse-Geisser correction (see table 17) indicated that $F(1.35,4.04) = 19.116, p < .01$.

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>factor 1</td>
<td>Sphericity Assumed</td>
<td>311.167</td>
<td>2</td>
<td>155.583</td>
<td>19.116</td>
</tr>
<tr>
<td></td>
<td>Greenhouse-Geisser</td>
<td>311.167</td>
<td>1.345</td>
<td>231.353</td>
<td>19.116</td>
</tr>
<tr>
<td></td>
<td>Huynh-Feldt</td>
<td>311.167</td>
<td>2.000</td>
<td>155.583</td>
<td>19.116</td>
</tr>
<tr>
<td></td>
<td>Lower-bound</td>
<td>311.167</td>
<td>1.000</td>
<td>311.167</td>
<td>19.116</td>
</tr>
<tr>
<td>Error (factor1)</td>
<td>Sphericity Assumed</td>
<td>48.833</td>
<td>6</td>
<td>8.139</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Greenhouse-Geisser</td>
<td>48.833</td>
<td>4.035</td>
<td>12.103</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Huynh-Feldt</td>
<td>48.833</td>
<td>6.000</td>
<td>8.139</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower-bound</td>
<td>48.833</td>
<td>3.000</td>
<td>16.278</td>
<td></td>
</tr>
</tbody>
</table>

Table 17: BD Tests of Within-Subjects Effects,

Looking at table 18: Pairwise Comparisons Bonferroni’s post hoc analysis determined that a significant difference was found between the first assessment and the second assessment. However, no significant difference was found between the second assessment and the last assessment. There was a significant difference between the first assessment and the third assessment.
In summary, the ANOVA measures with a Greenhouse-Geisser correction were statistically significantly between time points $F(1.35,4.04) = 19.116, p < .01$.

Bonferroni’s post hoc test analysis determined a significant difference between the first assessment to the second assessment and from the first assessment to the last assessment, but not between the second assessment and the last assessment.

**Table 18: BD Pairwise Comparisons**

<table>
<thead>
<tr>
<th>(I) factor 1</th>
<th>(J) factor 1</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Bound</td>
<td>Upper Bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>-9.500*</td>
<td>1.555</td>
<td>.026</td>
<td>-17.050</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>-11.750*</td>
<td>1.702</td>
<td>.019</td>
<td>-20.015</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>9.500*</td>
<td>1.555</td>
<td>.026</td>
<td>1.950</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>-2.250</td>
<td>2.626</td>
<td>1.000</td>
<td>-15.004</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>11.750*</td>
<td>1.702</td>
<td>.019</td>
<td>3.485</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>2.250</td>
<td>2.626</td>
<td>1.000</td>
<td>-10.504</td>
</tr>
</tbody>
</table>

* The mean difference is significant at the
b. Adjustment for multiple comparisons: Bonferroni.

**Figure 11: BD Estimated Marginal Means of Measure 1**
The Profile Plot (see figure 11 and table 19) indicates that the pattern of the therapeutic process could be described as follows:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. assessment</td>
<td>0</td>
</tr>
<tr>
<td>2. assessment</td>
<td>+ significant</td>
</tr>
<tr>
<td>3. assessment</td>
<td>+</td>
</tr>
<tr>
<td>1. assessment - 3. assessment</td>
<td>+ significant</td>
</tr>
</tbody>
</table>

Table 19: BD Improving (+), Deteriorating (-), Neither improving nor deteriorating (0)

The conclusion is that the statistical analysis indicated that three independent music therapists and the researcher measured DC’s therapeutic process to improve with significance over time.

7.3.5 Evaluating the same sound sample
As mentioned in chapter 7.2.1 data also was collected from one non-clinical man and one non-clinical woman. The 10 sound samples were added to the whole collection of data three times. This meant that the assessors would evaluate the same non-clinical sound file three times. All the collected 87 sound samples were pooled for the evaluation.
A simple calculation shows how the individual score of each of the four music therapists (the researcher is the fourth assessor) is the same in all three cases, in two out of three cases, or is a different score in each case. These scores have not been analysed statistically because they are not related to the research questions. However, the calculation exists and can be studied in appendix for chapter 7, The assessor’s own interreliability, USB-memorystick.
Partial conclusion of the statistical analysis

All data were entered into SPSS for each client at each time-point (first assessment, second assessment, and last assessment) with each individual rater’s scores. The Pearson’s correlation used to measure inter-rater reliability showed that the inter-rater reliability of VOIAS-1 was significant. This is a promising result. It supports and validates that the next possible step is to carry out a wider test of VOIAS-1 with a larger sample size for a further validation study of VOIAS-1.

A Spearman’s Correlation was run in order to examine the parameter Body closer on the total scores by rater. Spearman’s rank order correlation calculation found a significant negative correlation between Rater 4 (the researcher) and Rater 3. A significant negative correlation between two raters is unusual. It says that the higher one rater scored, the lower the other rater scored it. It could be discussed as to why there was a significant negative correlation, and what this means as a part of this assessment profile.

When pooling the data where sound samples collected from one non-clinical man and woman. Each sound sample was added three times. This meant that the assessors would evaluated the same sound sample three times without knowing it. When studying each assessor’s own inter reliability towards the same sound sample it turned out that Rater 3 was presenting the lowest inter reliability evaluating 46% of the sound samples equally. Rater 3 was also the only rater who presented evaluating the same sound sample totally differently each time (6%). This show a tendency for Rater 3 to approach the evaluation as a whole differently from the researcher, Rater 1 and Rater 2. The assessors own inter reliability can be viewed in appendix for chapter 7, The assessor’s own interreliability, USB-memorystick. This could be the explanation as to why there was a significant negative correlation between the researcher and Rater 3.

Finally a Repeated Measures ANOVA was completed using all of the raters’ scores at each of the three time points and between the first and third time points. Bonferoni’s post hoc analysis was completed to determine where any significant changes might have occurred. The analysis of the overall score of all four clients looking into the possibility of VOIAS-1 to evaluate change over time showed, that VOIAS-1 has the potential to be able to document significant changes over time. This is also a promising result supporting and validating that VOIAS-1 have the potential to document and validate change over time in the therapeutic process. However it will later (in chapter 8) be explored how the patterns found describing the therapeutic process applied with VOIAS-1 is compared with the process found described in the psychoacoustic analysis.
7.4 Evaluating the VOIAS-profile: Three qualitative follow-up interviews

The first tryout of VOIAS-1 was, as mentioned earlier, carried out by three independent music therapists. In order to evaluate and examine the function of VOIAS-1s as well as its potentials and limitations a follow-up interview of the three music therapists was planned and carried out. As mentioned in chapter 7.2, the three music therapists were informed beforehand about the purpose of the interview and given a detailed sequence of 15 carefully worded questions addressing different themes of the VOIAS profile (see table 20 in 7.4.1.3). In the following the design and the methodology of the follow-up interview will be described in detail.

7.4.1 The design and the methodology of the follow-up interview

The design is according to Robson (2002), a flexible qualitative design. It can furthermore be described as an emergent qualitative design, where the method is developed partly during the data collection and analysis process, rather than following a certain procedure as in a fixed quantitative design. The purpose of these interviews guided the process, i.e. the research questions were forming the design and not the other way around. (Robson 2002)

7.4.1.1 A phenomenological approach

The intention of the follow-up interview with the three music therapists was to look into how they experienced the function of the VOIAS profile. The approach therefore was phenomenological.

The phenomenological interview research method was based on several concepts. According to Kvale and Brinkmann phenomenological generally in qualitative inquiry is a term that points to an interest in understanding social phenomena from the actors' own perspectives and describing the world as experienced by the subjects, with the assumption that the important reality is what people perceive it to be (Kvale and Brinkmann 2009, pp 26). This open phenomenological approach to the meanings of phenomena also affects how the meaning condensation is approached.

According to Grocke and Forinash (2005) the phenomenological approach embraces the complexity in the belief that there are many aspects that contribute to any experience, and to fully comprehend the general function of the VOIAS profile it is important to include any aspect. In other words, the purpose is to obtain as rich and nuanced descriptions of the experience with the VOIAS profile as possible.

Another concept is both the interviewees and the interviewer’s consciousness and directedness towards the intentionality and purpose of the interview, which in this study was directed towards 1) the VOIAS-profile as a whole, 2) the guidelines for assessing each discipline, 3) the vocal parameters and the possibility of assessing them, 4) the missing elements or parameters in VOIAS, and 5) the function of the VOIAS profile. Besides these main themes the interview was also meant to collect information on the interviewee’s thoughts about VOIAS as a means to provide 1) data that can make change over time evident or visible, 2) information that can be understood by other members of the interdisciplinary team, 3) data that can contribute towards diagnosis, 4) if the three music therapists could possibly use parts of the assessment profile or the assessment as a whole within their population, and 5) if the assessment would be understandable and relevant to the client.

While carrying out a phenomenological interview it was important to bracket the interviewer’s beliefs about the VOIAS profile being studied in order to arrive at an unprejudiced description of the essence of the interviewee’s experiences according the VOIAS profile. This was done in order to learn something about the limitations and potentials of the VOIAS profile, and search for the essential critique.
In this study a bracketing approach was about being fully present with the experience of the three music therapists as it was revealed. This involved listening carefully, being open with an engaged and curious attitude as well as exhibiting a sensitive mind to whatever theme the interviewee addressed connected to VOIAS (Grocke and Forinash 2005).

A bracketing approach was therefore also about keeping a flexible attitude during the interview, and trust intuitive skills in asking second questions, clarifying and exploring the meanings and experiences relevant to the project with respect to working out a more finished version of an emergent VOIAS, and the analysis carried out later (Kvale and Brinkmann 2009).

The phenomenological interview research method was based on a reflective attitude towards my own knowledge and experience in order to get as much feedback as possible out of the first tryout of the developed VOIAS. Therefore both a reflexive and an empirical phenomenological model were implied for the evaluation of this first tryout of the VOIAS profile: an empirical phenomenological method where the focus was on the three music therapists’ experience of using VOIAS, and a reflexive phenomenological method where the focus was on my own experience (Grocke and Forinash 2005).

7.4.1.2 The semi-structured phenomenological interview

The phenomenological interview was semi-structured. In a semi-structured interview the order of the questions does not need to be presented in a given order, but can be modified. It is even possible to rephrase the question so it suits the interviewee. As the interviewee was unfolding his or her experience the interviewer sometimes sought further detail and understanding by asking for greater details (Robson 2002, Grocke and Forinash 2005).

The types of interview questions varied. Some were direct in character, others more introductory, but probing and structuring questions were also employed. Direct questions are when the interviewer directly introduces topics and themes. These often appeared after the interviewee gave his or her description and indicated which aspects were central to them. Introductory questions are opening questions and when applied they provided descriptions of main aspects of the VOIAS profile. The probing questions were applied when more detailed descriptions were required to explore the difficulties or reflections on how practicable the VOIAS profile was experienced, but without stating what considerations was taken into account. This offered the possibility to discuss general themes for future research into the assessment profile. As the interviewer I took a structuring role by making sure to keep and follow a procedure by addressing each question one by one, and being sure to keep the time schedule as well as addressing all questions. Therefore structuring questions were also applied. This is done by indicating when a theme is exhausted by directly or politely break off long answers irrelevent to the investigation, as well as to ensure all questions were addressed (Kvale and Brinkmann 2009).

I did the interviews myself in order to obtain as detailed a record as possible, knowing that I then would take the double role as researcher (constructor of VOIAS) and interviewer. My reasons for taking this double role were that the purpose of the follow-up interview was closely connected to the construction of the VOIAS profile. It would be very difficult for another person, not familiar with the VOIAS profile to ask additional questions. Furthermore it was necessary to be able to sense the immediate meaning of an answer, and this required knowledge of the function of the VOIAS profile as well as attention towards what was important to acquire knowledge about in the interview.

7.4.1.3 Setting the interview stage

The three independent music therapists were informed about the purpose of the interview and given a detailed sequence of 15 carefully worded questions addressing different themes of the VOIAS profile beforehand (see table 20).

When setting the interview stage each interview was arranged within a time frame of 60 - 90 minutes. The interview took place...
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at the interviewee’s work place. The interview I set up was as close to the finishing of the assessment as possible so the different experiences of working with VOIAS were fresh in mind.

I made sure that the interviewee found him/herself ready, and had the time relative to his/her work situation. It was arranged that both the interviewee and myself had the questionnaire at hand, as well as all the test material. The interviewee was then again briefly introduced to the purpose of the interview, the use of a sound recorder, and asked if he or she had any questions before starting the interview.

Each interview was audio-recorded on an Edirol recorder, which is easy to handle. It was placed between the interviewee and myself and was started when the interviewee found himself/herself ready to start. At the end of the interview the interviewee handed over all the test-material to me as well as the written answers, if any.

7.4.2 A phenomenological based meaning condensation of three follow-up interviews

The audio-recording of the three follow-up interviews of the three music therapists was analysed according to a phenomenologically based meaning condensation. This is a method developed by Giorgi (1975) and involves certain steps which inspired the systematically analysis applied in this study.

According to Kvale and Brinkmann "Meaning condensation entails an abridgement of the meanings expressed by the interviewees into shorter formulations" (Kvale and Brinkmann 2009, pp 205). This means that long statements are compressed into briefer statements, and the main sense of what is said is rephrased in few words. Meaning condensation can serve to analyse extensive and complex interview texts. Giorgi (1975) developed one form of meaning condensation on the basis of phenomenological philosophy that involves several steps. Based on Forinash and Grocke (2005) and Kvale and Brinkmann (2009) Giorgi’s steps are synthesised in table 21.

Table 20. Questionaire for the follow-up interview

<table>
<thead>
<tr>
<th>Questionaire for the follow-up interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Was the introduction under the guidelines to the Voice Assessment profile (VOIAS-profile) well enough explained to understand its intentions?</td>
</tr>
<tr>
<td>The Guidelines:</td>
</tr>
<tr>
<td>2. Were the guidelines for the analysis of the Glissando clear and complete? If not what further information would be helpful?</td>
</tr>
<tr>
<td>3. Were the guidelines for the analysis of the CoreTone clear and complete? If not what further information would be helpful?</td>
</tr>
<tr>
<td>4. Were the guidelines for the analysis of the CoreToneVolume clear and complete? If not what further information would be helpful?</td>
</tr>
<tr>
<td>5. Were the guidelines for the analysis of the Song clear and complete? If not, what further information would be helpful?</td>
</tr>
<tr>
<td>6. Were the guidelines for the analysis of the Improvisation clear and complete? If not what further information would be helpful?</td>
</tr>
<tr>
<td><strong>The vocal parameters:</strong></td>
</tr>
<tr>
<td>7. Where there any elements in the VOIAS-profile that was not possible to evaluate considering the five different tasks there were undertaken for the VOIAS?</td>
</tr>
<tr>
<td>8. Was anything missing from the profile that you noticed as important as you listened to the sound files? This is concerned with vocal characteristics you were not asked about in the profile.</td>
</tr>
<tr>
<td>9. Do you think the analysis of the five different tasks provide data that make change over time evident or visible?</td>
</tr>
<tr>
<td><strong>The Function of the profile:</strong></td>
</tr>
<tr>
<td>10. Is the function of the profile:</td>
</tr>
<tr>
<td>- too limited</td>
</tr>
<tr>
<td>- too complex</td>
</tr>
<tr>
<td>- or is it good enough?</td>
</tr>
<tr>
<td>If you think the profile is either too limited or too complex, please comment on why you think that?</td>
</tr>
<tr>
<td>11. Will the results found from the VOIAS-profile be useable when making clinical reports on therapy work to other members of the multidisciplinary team?</td>
</tr>
<tr>
<td>12. Do you think the information that this provides will be understood by other members of the interdisciplinary team?</td>
</tr>
<tr>
<td>13. Do you think that the VOIAS could contribute towards diagnosis?</td>
</tr>
<tr>
<td>14. Do you think that the results from the VOIAS will be understandable and relevant to the client?</td>
</tr>
<tr>
<td>If yes, which parts of it?</td>
</tr>
<tr>
<td>If no, why not?</td>
</tr>
<tr>
<td>15. Can you imagine, that you could use part of this assessment profile, or the assessment as a whole within population?</td>
</tr>
</tbody>
</table>
In this study the protocol described below was composed in order to analyse the phenomenological interviews inspired by Giorgi’s steps in the phenomenological based meaning condensation.

The approach for interpreting the transcriptions of the interviews is based on the theoretical foundation for my clinical approach to voicework as described in chapter 4, the “Clinical approach as a research method”. Furthermore I have comprehensive theoretical knowledge as well as comprehensive practical and clinical experience in voicework.

7.4.3 The protocol for carrying out the analysis

It is not without complications to make a transcription, because there is a huge difference between sitting face to face talking, and reading a transcript of an interview. A lot happens in the process of translating an oral interview conversation into a written text in the form of a transcript amenable to analysis. In the process of the transcription, practical and principal decisions have to be taken considering full stops, comma and so on, which may affect the meaning. These decisions will most likely be based on and affected by the interviewer’s memory of the interview and the interpersonal interaction (Kvale & Brinkmann 2009).

This means that the transcription is biased by me, and therefore I consider the transcription a part of an interpretative process of the interviews. Thus it is important to distinguish between a biased subjectivity and a perspectival subjectivity. A biased subjectivity is when the analytical work done is unreliable and sloppy. This will occur when the researcher only notices and reports statements supporting the researcher, leaving out or overlooking counter evidence. A perspectival subjectivity appears when the phenomenon investigated is described and reported from different perspectives and different attitudes not necessarily confirming the researcher’s opinion or wishes for outcome.

In this study a systematically analytical process was applied in order to ensure a perspectival subjectivity. Then subjectivity will not be a weakness, but instead testify to the richness of the interview research. (Kvale and Brinkmann 2009)

As mentioned above, a protocol was composed inspired by Giorgi’s steps described above in a phenomenologically based meaning condensation (see table 22). In this protocol the transcript was included as part of the different steps in the analysis. The protocol therefore clarifies all discreet steps in the analysis ending with how the results are presented.

7.4.3.1 Transcribing the interviews

The form of the transcription is dependent on

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**Giorgi’s steps in a phenomenological based meaning condensation**


**Step 1.**

Reading the complete interview to get a sense of the whole.

**Step 2.**

Natural “meaning units” of the text and key statements are determined and highlighted by the researcher.

**Step 3.**

Researcher groups similar statements into self-contained meaning units.

**Step 4.**

The “meaning units” and statements of the interviewee are transformed, but carefully retaining and restating the content of the interviewee’s experience by the researcher as simply as possible focusing on the interviewee’s viewpoint as understood by the researcher.

**Step 5.**

The transformations and meaning units are placed in terms of the specific purpose of the study and within the study’s question.

**Step 6.**

The researcher synthesizes meaning units into descriptive statements of essential meanings and non-redundant themes from the entire interview.

Table 21. Giorgi’s steps in a phenomenological based meaning condensation
The protocol for analysing three phenomenological interviews inspired by Giorgi's steps.

Step 1.
Make a word by word transcription of the three interviews.

a) make pauses visible by typing (-).
b) if the same word is repeated

c) divide the interview into sections according to the questionnaire.

Leave out:

a) sounds like: hm, oh,
b) if the interviewee or the interviewer is breaking in, mark this by three dots (...)
c) intonation, emotional expressions, laughter etc

Read the complete interview to get a sense of the whole.

Step 2.
Copy the uncensored transcription into a new document. Determine and highlight natural "meaning units" of the text and key statements.

Make the speaking language closer to a written language and amenable to analysis.

This version is sent for the three interviewees for member-check. This is the version, which constitutes my data for the further analysis.

Step 3.
Make categories according to themes that are addressed besides the questions posed.

Step 4.
Transform the "meaning units" and statements of the interviewee, but by carefully retaining and restating the content of the interviewee's experience as simply as possible focusing on the interviewee's viewpoint as understood by the researcher.

Place the transformations of the "meaning units, key statements and categories according to themes addressed in terms of the specific purpose of the study and within the questionnaire.

Step 5.
Synthesise Step 4 of the three interviews into descriptive statements of essential meanings and non-redundant themes and categories within each question posed in the entire interview.

Condense those questions where it is possible into a three point Likert scale (e.g.: clear, quite clear and unclear).

Step 6.
Translate the result from Step 6 into English.

The primary purpose of the transcription was to ensure the rich answers and descriptions of any experience that the three independent music therapists had during the first tryout of the VOIAS profile.

This involved descriptions of difficult, problematic or critical questions towards how applicable the VOIAS profile was experienced, as well as their understanding of the chosen parameters evaluated by following a developed manual. This is essential in order to adjust the VOIAS profile if applied and tested in a bigger context.

Because of the above described purpose, the transcripts were the primary data for my systematic and detailed analysis. The audio-recordings were secondary data, available if or when there was a need for going back to this source and checking up on something.
7.4.3.2 Ethical considerations for member-check and the member check

When transcribing the interview there are always ethical and interpretative considerations to be taken. First of all it is important to take confidentiality into consideration.

Therefore, in order to protect the interviewee, private data, which may identify the participant, was not disclosed. Already in the first draft of the transcription I therefore deleted the name of each single interviewee and left out events and persons spoken about in the interview, which could easily be recognised. Only passages addressing the VOIAS profile were included for further analysis.

When asking for member-check there are also ethical concerns to consider. It can be a substantial challenge, and in some cases it can be too overwhelming to see one’s way of speaking in print. It will appear very clearly what speaking habits each person has (Kvale and Brinkmann 2009).

In this study it was planned that the transcript, step 2 in the protocol (see above), was sent to the three interviewees for member check. In the document natural “meaning units” and key statements were highlighted, and the speaking language was closer to a written language.

By making member check of the transcripts the three interviewees validate this second step in the analysis, and the transcripts are considered for empirical data.

However, due to intrusive events the member check happened a very long time after the actual interview was carried out. Still, the interviewed music therapists were offered the opportunity to do a member check and add what remarks they might have.

7.4.3.3 Making annotations and ongoing “checking up”

In reading the interview over and over again, the researcher can reflect theoretically about different themes and topics and make interpretations without following a certain method or technique systematically (Kvale and Brinkmann 2009). In “listening” carefully to the text, being open and sensitive to the many differences of experiences for the interviewees. I quickly realised that it was important to make ongoing annotations about spontaneous reflections popping up when carefully reading the statements and themes.

The result of this text analysis was always checked by going back through the different steps, sometimes all the way back to the raw text of the interview to make sure that the statement were understood in the right way, and that the analysis was true to the interviewee’s statements.
7.5 Results from the phenomenological based meaning condensation

In the following the results and considerations from the phenomenological meaning condensation are presented. It is a translation of Step 5 in the analysis process following the protocol presented in chapter 7.4.3.

The questionnaire handed out to the three independent music therapists provides the structure.

The presentation of the results will begin with selected quotations of key statements by the interviewees. A full presentation of the key statements by the interviewees is available in Danish in appendix for chapter 7, USB-memorystick.

Then follows descriptive statements of essential meanings and non-redundant themes and categories within each question. In each case I have added my reflection and considerations according themes addressed that may be subject to more extensive interpretations and theoretical analysis.

The structure of the analysis will be hold by the questionnaire.

“Body” will as part of question 7 be explicitly analysed since it was a parameter the three independent music therapists agreed was very difficult to approach.

1. Was the introduction under the guidelines to the Voice Assessment profile (VOIAS-profile) well enough explained to understand its intentions?

**NATURAL MEANING UNITS AND KEY STATEMENTS**

I definitely thought it was understandable.

Yes, I actually think that it was very thorough. … technical with a nice overview. I think the schemes were constructed in a way that gives a good overview.

**CONDENSATION**

The amount of sound-samples and the size of the manual was overwhelming right in the beginning, and the interviewees had to get used to the fact that the manual was written in English.

All in all the three music therapists experienced the guidelines of VOIAS as being well enough explained to understand its intention. The clarity of the layout was addressed, and it was stated that it supported getting an overview of the assessment profile easily.

**CONSIDERATIONS**

I am aware of the fact that the tryout was overwhelming. The three music therapists listened to 87 different sound samples during a very short time, something which most likely will not happen in daily clinical practice.

**Summing up:**

Therefore I conclude that as a whole the introduction under the guidelines of VOIAS-1 was clearly explained.

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**The Guidelines:**

2. Were the guidelines for the analysis of the Glissando clear and complete? If not, what further information would be helpful?

**NATURAL MEANING UNITS AND KEY STATEMENTS**

I had to ask you a couple of times, because I did not understand the purpose. Some time passed before I realised that it was the ending pitch.
Even though this was mentioned in the Manual.

... when men and women sing in the same tone it sounds differently by one octave. I must admit that I one day might have scored them differently by one octave, while another day I might --- It is not certain that I have been consistent.

CONSENSATION
The guidelines for the glissando are experienced as being clear and complete. There is furthermore an agreement about the glissando being an easy and simple discipline to start out evaluating compared to the following disciplines.

All three music therapists contacted me according to parameter 2, the ending ascending glissando. They all expressed difficulties in understanding the intention of the task, and furthermore expressed that it did not immediately make sense even though this was presented in the manual. One suggestion to solve this problem was to change the order of the sound samples, meaning taking into consideration to begin with an example that supported the task and the intention of the task.

In measuring pitch the three music therapists either used keyboard or both a piano and a keyboard. Measuring pitch as an assignment in the VOIAS-profile as a whole, offered difficulties of accuracy, either because of the keyboard or because of the fact that women and men sound with a difference of an octave.

CONSIDERATIONS
In the manual I describe how the client is instructed to slide as fluently as possible all the way up to the highest possible note she/he can reach in sound, and then is instructed to breath in deeply, and start the descending glissando. In this description I do not clarify that the client also is instructed in letting go of the sound at the highest note, while emptying the lungs of air. However this essential information is mentioned both in the section describing the “movement and imagery connected to the motion of sound” as well as in the instruction for evaluating parameter 2. Still it is worthwhile to consider rephrasing and shorten the description of the exercise as a whole. It is also worthwhile to consider if this confusion is caused by not knowing the purpose with the exercise and how this information can be interpreted. This give reasons for applying training in employing the VOIAS profile.

Most keyboards have fewer keys than a piano. This offers some technical difficulties in measuring the pitch and being sure about the frequency sounding. As mentioned in chapter 4.6 the different intensities in the harmonic series may sometimes cause difficulty in the subjective determination of the pitch (Colton et al. 2006). This is a fact proven to be true also in this study. A consideration may be if ear-training would provide a higher accuracy. The manual does not mention anything about how men and women sound with a difference of an octave. It is worthwhile to consider if this information should be added.

Summing up:
Summing up the conclusion is that the guidelines for the analysis of the Glissando were experienced as quite clear and complete.

3. Were the guidelines for the analysis of the CoreTone clear and complete? If not, what further information would be helpful?

NATURAL MEANING UNITS AND KEY STATEMENTS

Loudness:
This model has more soft descriptive values than powerful. So it is a purely musical thing, … …. You also could have written fortissimo as the outermost extreme in the powerful, then pianissimo here, and then piano and a mezzo. … …. You could also have written very soft – very loud opposite each other. There is an uneven balance in it.
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Richness:
I struggled a little bit with that one and that is because you use rich twice. I think that is confusing.

CONDENSATION
The guidelines for the analysis of the CoreTone are experienced clear and complete. However, was some difficulties with the parameter loudness were addressed.

Ad: Where the sound is to be assessed
The sound-samples are generally experienced extensive, and furthermore it is observed that the human voice change character several times during the sounding of the exercise. This provides the evaluation with complexity. It is suggested that the sound samples could be shorter, and picked out by me in the understanding that this would support the evaluation’s reliability.

Ad: Likert-scale:
It is discussed if all the five gradient in the Likert scale should be defined. This discussion arose from the fact that all five gradients in the Likert-scale about the parameter loudness were defined in the manual. It was stated that all in all the Likert-scale seemed more adaptable if only three of the five gradients were defined.

Ad: Loudness:
The parameter loudness causes to a small problem. There is a need for knowing what the sound samples in relation to loudness are compared to. In the evaluation the sound samples in general have been evaluated in relation to music and singing. Therefore the Likert scale of loudness is considered unbalanced, and it is pointed out that the Likert scale of loudness in this study has more soft values than powerful values. It is suggested that the loudness Likert scale should have the following values: fortissimo vs. pianissimo having mezzo as a mean value, or very soft vs. very loud. This first suggestion has a musical approach whereas the other suggestion approaches the evaluation in the same way as in the field of speech therapy.

Ad: Richness
It is confusing that the word rich appears twice in the parameter richness.

Ad: Tense vs. Breathy
It is stated that the compression and breathiness of the voice are dependent on how loud the person is singing. Otherwise the task is clear and complete.

CONSIDERATIONS
It is important to have in mind that the evaluation of the sound-files intends to come as close to a situation in clinical practice as possible. Therefore the sound-files are in their natural duration in each exercise. The experienced complexity of evaluating a natural duration of a vocal exercise therefore give reasons to consider training before the VOIAS profile is employed in clinical practice.

The construction and employment of the VOIAS profile is based on the intuitive function of listening and perception (see chapter 4.8.2). The critique and suggestion about cutting the sound-file where I would evaluate the voice made me reflect further on my own procedure. I found that I took assumptions about how the approach would be in general, and this also supports the fact that training in applying the VOIAS profile should be considered. It should furthermore be considered to adding that the voice is to be assessed where the vocal expression is most clear and open during the sounding of the CoreTone.

Ad: Likert-scale:
All five gradients in the Likert scale of the parameter loudness were defined, although it was the intention to leave out gradients 2 and 4. Based on the interview the Likert scale is experienced clear and complete with defining levels 1,3 and 5 in the Likert-scale. This will furthermore support the intuitive approach. The theme will be further elaborated in the analysis below and of question 5.

Ad: Loudness:
In the manual I have not mentioned what the evaluation is related to; music, singing or vocal expression in general. I have realised that I took for granted that the three music therapists would evaluate in relation to vocal expression, and what is
known of the human voice’s capability of projecting.
This is related to the understanding and approach of voice work, and therefore it should be considered how this information is best provided when employing the VOIAS profile.
The critique according to the choice of words in the loudness Likert scale has made me aware of the fact that I unconsciously have related the loudness Likert scale to people suffering from depression. Therefore there are more soft values than more powerful values. The loudness scale in this study cannot contain a vocal expression of shouting or singing very powerfully and loud. This should therefore be corrected so the loudness Likert scale is balanced between soft and powerful values. It should also be considered if the choice of words should be musical or speech oriented.
This critique makes the Likert-scale unbalanced, but not unclear.

Ad: Richness
In the manual and the VOIAS profile is level 5 in the Likert scale is defined as: very full / rich. The word “rich” also appears in level 3 of the Likert scale. It is suggested that level 5 in the Likert scale should be defined as: very full / very rich, and level 1 in the Likert scale was defined as: very flat / very thin.

Ad: Tense vs. Breathy
The statement raises reasons for considering if the approach and understanding of voice work may affect an evaluation.

Summing up:
The analysis of the CoreTone concludes that the parameter body is unclear, but the rest of the parameters in VOIAS-CT are clear and complete. So all in all the profile is quite clear.

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4. Were the guidelines for the analysis of the CoreToneVolume clear and complete? If not, what further information would be helpful?

The three interviewees now start to leave out a precitation of how clear they experience the guidelines, and instead directly start to address those themes and parameters they have reflections about or find confusing.

NATURAL MEANING UNITS AND KEY STATEMENTS
I would like instructions regarding having to define or mark the sound based on a sort of “peak-tone”, or where in the crescendo we were supposed to mark? … Because that is also a peak-moment and peak. It is often there it happens. There, emphasizing it as an expression. That was just my idea but of course you will get top points, which are not medium points. It is very hard to judge a central point, while it is considerably easier to judge the outer points.

CONDENSATION
The difficulty in measuring Loudness is about how to measure the process of sounding a crescendo. A more specific explanation is missing about where in the crescendo process the measurement is going to take place. It is suggested that the focus is on the moment where the crescendo peaks, and name this a Peak-Tone of the CoreToneVolume. Another suggestion is to mark a span of loudness like in the discipline of the improvisation.

CONSIDERATIONS
The manual has not clarified where the human voice should be evaluated more precisely according to the CoreToneVolume exercise. I have in constructing the manual taken for granted that it would be evaluated where the tone had most power. Therefore it should be clarified in the manual that the assessment is going to take place when the client reaches a maximum in volume. It could be considered to define this as a PeakTone in the process of sounding the CoreToneVolume. This is however intuitively understood. PeakTone goes well with the intention of the exercise where The CoreToneVolume exercise in clinical practice is about exploring the maximum for volume feeling comfortable to sound.

The idea of evaluating the span of loudness level has turned out to be difficult to handle (see guidelines for the analysis of the Vocal Improvisation, Appendix 11). The client is instructed to start sounding the CoreToneV-
volume as silent as possible, and to allow the CoreTone gradually grow in volume. Therefore a less complicated solution would be to add a remark if, as an example, the client is not able to start the exercise very silent.

Summing up:
All in all I find that some corrections have to be made in the guidelines to make it more clear and precise, but still it is not unclear so it is impossible to do the assessment. Therefore I conclude the guidelines quiet clear.

5. Were the guidelines for the analysis of the Song clear and complete? If not, what further information would be helpful?

NATURAL MEANING UNITS AND KEY STATEMENTS

Likert-scale:
It just has to be the same, I think, so I do not go from: here it is completely explained and here I still have to guess some of it.

Tension vs. Breath or How to measure one giving sound with closed mouth.
To sing with a closed mouth means a lot to the sound and to whether it is airy. And it is not that. But it is still wonderfully round. The sound. I fought a little with how to score that.

CONSIDERATIONS
It is important to notice that the more intuitive Likert-scale is not experienced as unclear. It is more concerned with the overall design of the assessment profile and the decision about how detailed it should be explained in the different levels of the Likert-scale. But it is important to mention in a general introduction in the manual that the Likert-scale builds on a subjective intuitive assessment.

In clinical practice it is an important piece of information about the client that he or she chooses to sing with closed mouth. So this experience give reason to consider the possibility of adding subjective descriptions to an evaluation.

Summing up:
The themes addressed do not make the guidelines unclear and incomplete. This has to do with gaining experience in assessing. Therefore I conclude that the guidelines for the analysis of the Song are clear and complete.

6. Were the guidelines for the analysis of the Improvisation clear and complete? If not, what further information would be helpful?

NATURAL MEANING UNITS AND KEY STATEMENTS

What is the baseline for the sound files?
Do we evaluate psychiatric patients? Is it in relation to them (the psychiatric patients)? In that case, I believe I have scored some of them a little farther out, if it were in relation to these 87 examples. But I constantly think about if it was me, and what I could do (with my voice). Or, compared to some of those I have heard or seen, what can they do with their voice. So that is ambiguous.

Span loudness:
Speaking loudly during an improvisation; that is not loud. It has to be yelling. If someone comes in here and starts screaming hysterically, where should that be written down?
Form and structure of the improvisation

Is it stiff to sing something in a certain pulse during an improvisation? Is it rigid to sing a song from church despite the fact that it is sung beautifully? I do not know for certain. However, it is completely monotonous and without significant fluctuations, but still very beautiful and heartfelt, in my opinion. This is when I start discussing with myself. Are you supposed to score it as varied? No, you are not. Very stiff and monotonous? I do not believe that, either. Perhaps it was just a very heartfelt and beautiful sound. I have a hard time evaluating this one.

CONDENSATION

The guidelines for the analysis of the Improvisation were experienced clear and complete.

Ad: The order of the parameters in VOIAS-IMP:

It is clarified, that it is unrealistic to assess Span of range as the first parameter in the VOIAS-IMP sheet. At the same time a flexibility towards order of evaluating the vocal parameters is introduced.

Ad: What is the baseline for the sound files?

The question about a baseline is addressed, and it is questioned if the sound-samples should be assessed in relation to each other or in relation to the knowledge and experience of what a human voice is capable of doing.

Ad: Span of loudness

It is pointed out that it would be a help to mention in the VOIAS-IMP that the Span of loudness is marked by two crosses. It is furthermore stated that speaking loud is not experienced as loud, and it is questioned how to evaluate a client shouting hysterical.

Ad: Form and structure of the improvisation

In the task of creating a vocal improvisation a client instead happen to end up humming a well know church song. This caused reflection upon how to evaluate the vocal parameter form and structure, and how the results from this evaluation would affect the conclusion of the analysis as a whole of the vocal improvisation as a whole. It is questioned if it is considered rigid to sing a song when asked to improvise, when the song is sung very tenderly and beautifully, although it at the same time is sung very monotone.

Ad: Fluency of breathing and vocalisation

It is pointed out that something can be experienced fluent although it is produced in a very slow tempo. Therefore it is questioned if the aim should be able to perform a singer-breathing, and if not-trained singers then should be assessed as not fluent. Furthermore the word fluent is equivalent to the word consistency, understood in that way that it is experienced fluent if the breathing duration is consistent.

CONSIDERATIONS

This addresses the approach of the assessment, and has no consequence for how clear and complete the profile of the evaluations of the vocal improvisation is. Keeping the row as it is, I think would support building up a routine and the way of working yourself through the different parameters in the assessment profile as a whole.

Ad: What is the baseline for the sound files?

There was no introduction to the sound samples. Therefore it was not clear what the baseline for the sound samples was, and it should be considered to make this clear in an introduction, that the assessment should be based on the knowledge and experience of what a human voice is capable of doing.

Ad: Span of loudness

In the same way as in question 3 the vocal parameter loudness is experienced as unbalanced and in need of something more powerful in contrast to very soft / quite. The solution to this problem is defined in connection with question 3. This is not something which renders the guidelines unclear.

Ad: Form and structure of the improvisation

In assessing the parameter Form and structure it is important to stick to what the task is, because otherwise the playfulness, and the “letting go” will not be evaluated. Thinking about how to use the VOIAS-IMP in clinical
practice, I would evaluate Form and structure as rigid / restricted, because the client was not able to let go and play freely vocally in an improvisation. And then I also would write a line about how the client was singing a song instead of building up an improvisation, because over time the client might be able to let go and become more playful, and actually do improvisations. In addition, there is the fact that the task of the discipline was not accomplished. This gives reason to consider the possibility of adding short remarks and descriptions to the evaluation of a discipline. The reflection also addresses the next step in a vocal assessment, the interpretation and how each vocal parameter is related to one another and as a whole. This is a task which the first tryout did not ask of the three music therapists, but which they start to do anyway.

Ad: Fluency of breathing and vocalisation
This parameter has to do with flow in the happening of sounding and breathing. Trained or not trained vocally, a person can do the breathing and sounding flowing, and an improvisation can be in flow though the improvisation is sung in a slow tempo. Furthermore I am not aiming for the clients to do singer-breathing, but aiming at a state of being where the person is the doing of the improvisation, embodied, and present. I also sense that understanding of the parameter fluency within the improvisation profile is mixed in with an above mentioned parameter fluctuation, because the words fluency and consistency are used side by side. But the present parameter has nothing to do with how consistent the tone is in the improvisation.

**Summing up:**
It is therefore concluded that the guidelines for the analysis of the improvisation is experienced as quite clear and complete.

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The vocal parameters:
7. Were there any elements in the VOIAS-profile that were not possible to evaluate considering the five different tasks that were undertaken for the VOIAS?

**NATURAL MEANING UNITS AND KEY STATEMENTS**

*There were not any parameters, that I did not score in. There were some that were difficult to evaluate.*

**Amount of parameters:**
*There are several parameters to keep separated, but I assume that it is necessary if you are to judge a voice. It requires great focus to keep them separated.*

**Loudness:**
*Loudness was not that difficult, and it made good sense.*

**CONDENSATION**
All the vocal parameters were experienced as possible to evaluate, but some of them were more complex to approach than others. The vocal parameter body was the more complex one, and therefore is analysed more in depth. In general the three music therapists were overwhelmed by the amount of parameters, and in the beginning it was experienced as difficult to differ the vocal parameters from one another.
The acoustics is another theme which was addressed, and considerations were made according to how the acoustics affect the voice quality of the individual. It is discussed that this may bias the evaluation. The subjectivity is also discussed in relation to the fact that there may be differences in understanding and approaching the human voice and the vocal parameters.

**CONSIDERATIONS**
As mentioned before it is very understandable that the voice samples are experienced as overwhelming. However, the only parameter which was significantly problematic was the vocal parameter body.
The acoustics is important for the experience of the voice, and this room was not perfect at all for recording, because it is too sonorous, and it should be considered that the evaluation may favourite some vocal qualities more than others. If it affects the voice so much that it will bias the outcome of a vocal assessment it should be considered, but it should at the same be considered that if the aim is to evaluate right after a session, then
the subjective experience of interacting together with the client also will be a factor that will bias the evaluation.

It should be considered that the function of the manual and the guidelines is aimed to equalise the scoring and evaluation despite the differences of vocal training, knowledge, approach and understanding the individual has about the human voice. One way of equalising it even more is to offer training in employing the VOIAS profile.

**Summing up:**
The conclusion is that all elements were experienced as quite possible to evaluate considering the five different tasks undertaken here for the VOIAS.

**The vocal parameters: Focusing on the “body” parameter**

**NATURAL MEANING UNITS AND KEY STATEMENTS**

I actually think that this body was intuitively easy to approach.

*This (body) is really important in relation to where they place their sound, in relation to how they work and feel.*

I believe that I towards the end could cross off body, but it was definitely the most problematic one. And I actually don’t believe it is because my work is not oriented around the body, as I in fact believe my work is.

It was hard with the body. Again, I thought I could cross off multiple places, and at that point it became even more relevant for me to put more crosses.

**CONDENSATION**

One music therapist experienced the parameter body as intuitively easy to approach, and found it a very important parameter providing information about the client’s state of being.

Another music therapist expressed an experience of a growing confidence in evaluating the parameter, but stated that this parameter definitely was the most difficult. It is discussed if this has something to do with how body-oriented the listening approach is.

A third music therapist found the parameter complex, and needed the possibility of placing more crosses in connection with one sound sample.

**Ad: Two body sensations during one sound performance**

It is noticed that the client’s sounding process sometimes is from an open sound ending with a closed sound ending in the head. This warrants placing two crosses in the parameter body.

**Ad: How to measure one giving sound with closed mouth?**

It is stated that the human voice has many different qualities and as an example it is not experienced as possible to evaluate or show in the evaluation that the sound quality is nasal. Furthermore the interview reveals many different associations and understandings of the words describing and defining the body parameter in general.

**Ad: Is the vocal sound embodied?**

One approach to the body parameter is described as considering if the voice has body or not. It is further described that the sound is understood as containing both a head sound and a chest sound, but the balance between the two may differ. The definition of a voice without body is that it is a thin voice with few overtones. The definition of a voice with body is defined as a rich/full voice with a certain volume and tension; not breathy.

**Ad: Definition of the vocal parameter body**

The VOIAS profile is experienced as inflexible because it is not broad enough so the client’s nuances can be shown.

The parameters are experienced technical, whereas the body parameter is experienced just on the edge of something else. The words inward and outward are experienced as making sense, and easier to relate to than the different body parts. Inward and outward are also easy to relate to clinical practice and the therapy work. These parameters offer a broader understanding than the different body parts.

It is questioned how to determinate which body part is to be selected when a sound can
be experienced both in the head and in the chest, and how it moves from one body part to another.

It is suggested that an approach of evaluating and determining the vertical body sensation is by imitating the vocal sound and sense it’s quality in the body.

In the interview a music therapist is asked to explain how a head- and chest-sound is understood, and it is correctly pointed out that the timbre also is influenced by the vowel, but a knowledge of spacial body sensation is missing.

When the different placements in the parameter body is illustrated to the music therapist, and the music therapist provided with a self-experience of the parameter body, it is already easier to understand for the music therapist. A spontaneous statement is, that maybe this parameter actually just need training in how to be approach and understood.

The reference sound-files in VOIAS-1 In measuring the sound quality of the CoreTone in relation to a spatial body sensation I have compiled two reference sound-files. These were experienced as more confusing than supporting.

CONSIDERATIONS
It should be considered whether to define and describe the approach and understanding of the parameter body in more detail.

Ad: Two body sensations during one sound performance
It is unclear where in the sounding process the evaluation takes place. It should be described clearly in the manual that the evaluation takes place when the sound is most open in the sounding process.

Ad: How to measure one giving sound with closed mouth?
The body parameter gives reason to consider training in employing the VOIAS profile.

Ad: Is the vocal sound embodied?
The reflection about how to determine whether a voice has “body” or not gives reason to consider how the body parameter can be described and defined more clearly and completely.

The above described approach also gives reason to consider that before employing the VOIAS there is a need for self experience in relation to the different vocal exercises and to discuss how voice work and vocal parameters may be approached and understood.

Ad: Definition of the vocal parameter body
It is easier to understand the horizontal definition of the body parameter than the vertical definition. The vertical definition is experienced as being difficult to relate to, but understood immediately when illustrated and tried out by the music therapist. This give reason to consider training in approaching and understanding the VOIAS profile.

It is important to notice that this parameter addresses a way of understanding and approaching a listening attitude towards the human voice, which is new, but sensed right away during self-experience. This listening attitude is very much connected to a certain direction within vocal and listening training. All in all the analysis of this parameter suggests that training is necessary to make the VOIAS-profile more accessible.

Ad: The reference sound-files in VOIAS-1
It should be considered whether to make a sound file illustrating the different parts while I explain. Just as I did when illustrating during the interview. But it should still be considered to offer training to make the VOIAS-profile more accessible.

Summing up
The parameter “body” is defined unclearly and incompletely, and is therefore complex to evaluate when considering the five different tasks that there were undertaken for the VOIAS.

8. Was anything missing from the profile that you noticed as important as you listened to the sound files? This is concerned with vocal characteristics you were not asked about in the profile.

NATURAL MEANING UNITS AND
KEY STATEMENTS

A mood-wheel
A kind of mood-wheel because I think that would say a lot too.

Qualitative description
Yes, a kind of qualitative description of the quality of the voice, where I, instead of crossing out, I wrote a sentence. … I thought that in the profile, it says a lot about how anonymous and free of personality a voice can be. There is a lot of personality within a voice and it is very qualitative. It is stuff like that I think is included in the observation of a voice, which says a lot about that person as a whole. You could use a qualitative approach, where you made use of some of the terms or key words and integrate them in order not to make the description too qualitative in a psychoanalytical way. You could have key words for a qualitative two-line description of the voice. It is a necessary part of my job. I’m thinking: immediate utilization in practice.

Form and structure in connection with a song:
Form and structure in connection with a song insecure about the melody but hits the right tone each time after a little hesitance. This is not really registered anywhere; the fact that there is a lot of hesitance and actually a great deal of instability, while at the same time the tone itself is fairly nice. In the improvisation this is categorised under form and structure. And in some kind of way, it becomes the way the song or melody’s line is structured or formed, but the ability to fill it out or keep the form is not registered.

CONDENSATION
Ad: A mood-wheel.
It is suggested to add a mood-wheel to the VOIAS profile.

Ad: A qualitative description
The possibility of making a qualitative description of how the clients voice and the performance of the discipline are experienced are missing. It is stated that it is very important to have something, which supplies the quantitative way of assessing the clients voice. It is addressed as a risk for the results of the interpretation of the voice analysis to be impersonal.

It is furthermore stated that it is very easy to interpret, but then also questioned how this interpretation can be validated.

A very good example is provided where the results and the conclusion of an interpretation of a voice analysis are supported by the words and evaluation in the profile.

It is furthermore pointed out that to keep up the motivation for doing a voice assessment there is a need for a qualitative part to be added, and it is stated that this will make the VOIAS-profile more holistic in its approach and conclusion.

A curiosity is expressed towards how to continue from this first step in a voice assessment.

Ad: Form and structure in connection with a song:
It is stated that the form and structure in singing a well known song is given, but what is important to be able to assess as well is also how this form and structure of the song are carried out.

CONSIDERATIONS
This is interesting because I have included a mood-wheel in my analysis of the vocal parameter: body.

Ad: A qualitative description
The expressed need for adding a qualitative chapter in the VOIAS profile confirms my basic general idea of having the possibility of adding small remarks and a qualitative description for each discipline. This part has been left out in this first try-out of the VOIAS-profile, because this was not in focus for this test (see chapter about the first try-out). Space for a more qualitative description will be the spontaneous beginning analysis and interpretation of the VOIAS, and in doing the more quantitative assessments you have the musical parameters to support the more narrative description of the client in the music therapy session.

Ad: Form and structure in connection with a song:
It should be considered to add the possibility of evaluating how the song is carried out. A suggestion could be to focus on fluency in the performance.

**Summing up**

There is a general awareness of the considerations on how to interpret results from an evaluation of the vocal parameters. Additionally qualitative parameters have been suggested to be added to the VOIAS profile.

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9. Do you think the analysis of the five different tasks provide data that make change over time evident or visible?

**NATURAL MEANING UNITS AND KEY STATEMENTS**

*Yes, I can imagine that.*

This experience from testing will have an impact on listening to the voice on a daily basis. Now that I have been through this, I cannot avoid listening more to the voices of my own patients. It will make my understanding more nuanced or sharpen the way I listen to the voice.

**CONDENSATION**

All three music therapists are of the opinion that the analysis from the five different disciplines will provide data that makes change over time evident and visible. It is furthermore stated that the present experience of evaluating and listening to structured to the human voice will affect the listening perspectives to be wider and more focused in the listening attitude.

**CONSIDERATIONS**

A natural consequence of the three music therapists’s experience of listening to different vocal expression in different vocal exercises has provided listening experience and put the human voice in more focus for overall attention in clinical practice. It is worth considering if the awareness towards the human voice in general has low priority within the field of music therapy.

**Summing up:**

There is an agreement about the analysis of the five different tasks to provide data that make change over time evident and visible.

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The Function of the profile:

10. Is the function of the profile:

- too limited
- too complex
- or is it good enough?

**If you think the profile is either too limited or too complex, please comment on why you think that?**

**NATURAL MEANING UNITS AND KEY STATEMENTS**

Approaching it for the first time is very complex. It will also require a great deal of training to use it. On the other hand, I also believe, when I just now scored nineteen examples within the same parameter right after each other, that it was fairly simple. … And gradually I could score two parameters for each sound bite. It is obvious that if you have been doing this for six months, you will most likely be able to sit and do the pages while listening.

For clinical use and clinical analysis the profile in its entirety is too comprehensive. But I can imagine making a more edited edition, in terms of applying it to a single part of e.g. a voice improvisation…. Then I think it would be a nice tool.

**Limitation**

The profile is extremely qualitative and very biased in the way you approach the task and how capable you are of listening to the different parameters.

**Support painting a more realistic picture**

I will cover parameters, which I have not noticed under the actual improvisation.

**CONDENSATION**

There is an agreement about the VOIAS profile being complex and comprehensive, but not too complex, and not limited. There is agreement about how the VOIAS profile gets easier to handle over time. By training it becomes easier to handle several parameters.
at the same time. The profile is comprehensively because of the many vocal parameters for each exercise. Thus the sound sample has to be played over and over again. This tires the ear and concentration. The comprehensiveness arises because it is difficult to differ the sheets from one another. It is stated that the profile needs training. It is stated that the evaluation of some of the first sound samples most likely will be different the second time, because of experience in listening.

For clinical practice the VOAIS profile as a whole is too complex, but it is stated that it is sufficient when taking one sheet at a time; in other words focusing on one vocal exercise at a time in clinical practice.

Ad: Evaluating the sound without listening to the recording of the session
The question is therefore raised if it actually is possible to evaluate right after a music therapy session on an intuitive basis although this raises considerations relative to the objectivity of the evaluation.

Ad: Growing experience and routine in “way of working”:
It is a general experience that the listening discipline expands with experience, as does the routine of approaching the VOAIS profile.

Limitation
The VOAIS profile is experienced as extremely quantitative, and it will be biased by how the work is approached, and how experienced the listener is.

Støtte til at give et mere virkeligt billede:
In daily practice it is easy to be happy for the client about a positive development. It is stated that the profile may offer an opportunity to be more aware of the actual vocal expression, because it provides a structure for coming around the vocal expression. This will support a more realistic picture of the client’s potentials and limitations and the possibility of evaluating the therapeutic process over time.

Considerations are raised about the acoustics and how this affects the voice. One voice may seem more alive in one room than another room.

CONSIDERATIONS
It is important to bear in mind that the situation the three music therapists have experienced evaluating 87 sound samples most likely will not happen in daily clinical practice. In clinical practice it is more realistic that the music therapist will have to evaluate an individual session, and therefore at most according to five different disciplines. It is even more likely that it only will be in connection with one exercise, and then the VOAIS profile is experienced as not too complex.

The experience of the three music therapists of working their way through 87 sound samples has pointed out that training in how to approach and practice the VOAIS profile should be considered. Training would furthermore ensure that the approach is homogenous, and this would ensure the reliability of the VOAIS profile in use. It should also be considered if it is reliable to use the VOAIS profile intuitively right after a session. The VOAIS profile presented to the three independent music therapists are quantitative. This has pointed out the importance to reconsider adding space for the possibility of qualitative descriptions and small remarks during an assessment. Additionally the acoustics is an important factor to take into consideration.

Summing up:
Although many considerations have been mentioned and stated it is my general conclusion that the profile is experienced as complex, but not too complex.

11. Will the results found from the VOAIS-profile be applicable when making clinical reports on therapy work to other members of the multidisciplinary team?

NATURAL MEANING UNITS AND KEY STATEMENTS
It is not for certain that other professional groups
will understand the form itself. …

But what comes out of it, I believe they will easily understand.

We can refer to the form when we write in the journal.

If it were to hand in a status report, then it would be included in my observations, but I do not know how much of it they would understand. I do, however, think that it would support something.

Make visible what you build your analysis on and how we work
The parameter will help remind us music therapists, that we must use of the musical observations – also in cooperation with our colleagues. In this way we can make clearer how we have observed change.

CONDENSATION
The three music therapists consider it very unlikely that other members of a multidisciplinary team will understand and make sense of the VOIAS profile, but the results found are believed to be applicable and understandable.

Considerations about how the field of music therapy develops its own language are raised. It is stated that it both is a problem and a basic need that the field of music therapy has its own terms.

It is furthermore stated by the three music therapists that the field of music therapy also is in need of being able to clarify the therapeutic processes to the interdisciplinary team. Thus it is important to find methods that can describe this, and support the clinical reports on therapy work. The three music therapists agree that the VOIAS profile will support the making of a clinical report and documenting therapeutic processes. The clinical report can refer to the results from the VOIAS profile.

It is stated that it is important to use both music therapeutic and psychological terms that can support the clinical observations.

CONSIDERATIONS
Considerations should be given to the form providing the results found from the VOIAS profile. Furthermore considerations should be given to the report containing both music therapeutic and psychological terms.

Summing up:
There is agreement about the results found from the VOIAS profile to being applicable when making clinical reports on therapy work to other members of the multidisciplinary team.

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12. Do you think the information that this provides will be understood by other members of the interdisciplinary team?

NATURAL MEANING UNITS AND KEY STATEMENTS
Some professional groups1 would be able to understand it easier than others and some parameters would be easily understood.

I have a tough time imagining that others would be able to understand the detailed plan.

CONDENSATION
All three music therapists find it hard to believe that an interdisciplinary team will understand the VOIAS-profile and the details about the vocal parameters. They state that it will depend on the individual if the information the VOIAS profile provides is understood or not.

CONSIDERATIONS
The three music therapists support my own reflections about this question, and confirm that it may only be the results and the interpretations of the assessment that will be understood. Considerations therefore should be given to the form of how the information connected to the VOIAS profile is provided.

Summing up:
The information that the VOIAS profile provides will most likely not be understood in its detail.

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13. Do you think that the VOIAS could contribute towards diagnosis?
NATURAL MEANING UNITS AND KEY STATEMENTS

Analyse - diagnostising
He has a rich sound and he sounds like he likes his sound. He sounds like he is enjoying himself a little bit. And the fact that he enjoys himself a little and gives himself the chance to sing in a quiet but beautiful sound. This does not fit with what I have otherwise marked (stiffness). So then it would be an important piece of information.

I really believe it would be difficult to give a diagnosis based on the voice.

Describe the clients in a different way – contribute to clinical investigations:
I wonder what a control group would show. A control group which, just as the clients, is not accustomed to using their voice. But they might not be completely depressed.

CONDENSATION
Generally it is stated that it would be difficult or unreliable to set a diagnosis based only on the outcome of a voice assessment. However it is stated that a voice assessment would contribute with important clinical information that would provide perspective to the clinical description of the client. This is supported by a description of how the evaluation of the individual vocal parameters within the vocal improvisation, when related to each other, does not make sense, and instead uncover important information about the client’s state of being.

Considerations are raised about the outcome of a voice assessment and the interpretation, if the client’s voice was caused by physiological problems. Furthermore it was reflected on how to approach a client singing out of tune, but still with a convincing vocal expression. There is general awareness about how clients suffering from comprehensive psychiatric problems do have characteristics in their voices easily connected to their state of being. It was no surprise to any of the three independent music therapists that this client group was suffering from depression, because there generally was very little expressed dynamics, and only few ideas for the vocal improvisation. But at the same time it was also stated that some people without suffering from depression do not perform any better. So it could be interesting to study the outcome in a control group.

CONSIDERATIONS
If the VOIAS profile is to be applied in clinical practice, it should be considered to establish a forum where it was possible to discuss and reflect upon the approach and understanding of the outcome of a voice assessment. The statements furthermore raise considerations about how the outcome of an analysis is provided to the interdisciplinary team.

Summing up:
It is agreed that the VOIAS profile may contribute with important clinical information about the client, but the profile will not be able to set the diagnosis.

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14. Do you think that the results from the VOIAS will be understandable and relevant to the client?
If yes, which parts of it?
If no, why not?

NATURAL MEANING UNITS AND KEY STATEMENTS
If it were music therapy students: Yes. If it were children that had ADHD: No. If it is patients confined to the closed ward: No. …. For those who did not get a problematic diagnosis. …. Adults in search of self-development. …. this is where I believe it would make sense. …. If it is interesting to them? That is not for certain. For me, it would be a good tool to have. …. So it is primarily for the music therapist.

In working with hard-ridden clients:
When working with hard-ridden clients it would be completely wrong with one such as this (VOIAS), but in the case mentioned above I would be able to use it myself.

CONDENSATION
It is stated that the VOIAS profile basically is a tool for the music therapist. There is an agreement among the interviewees that the
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VOIAS profile only will make sense to certain client groups; clients with the ability to reflect, adults looking for personal development, or out-patients. According to one interviewee the results from the vocal assessment would not be relevant to children and clients suffering from comprehensive psychiatric problems.

The purpose of involving the client in the results from a voice assessment at all is raised. It is also questioned if it is possible to assess very troubled psychiatric patients at all. However, it is experienced that the VOIAS profile would make sense for the therapist to apply in evaluating the therapy session afterwards.

It is furthermore suggested that the VOIAS profile could be applied as a tool for structuring the therapeutic work and encouraging the client. And finally it is suggested that the VOIAS profile may support clients in understanding herself/himself better when addressing body experiences connected to vocalisation.

CONSIDERATIONS

The statements and reflections of the three interviewees raise considerations about the importance of informing about the potentials of applying the VOIAS profile in clinical practice, and training in how to apply it. In this study the three music therapist performed the first step of an analysis focusing on the human voice. The possible psychological interpretations of a voice assessment were not discussed.

**Summing up:**

Basically the VOIAS profile is experienced as a tool only for the music therapist. If introduced to clients the criteria is a certain cognitive level of function, which provide reflection.

However, VOIAS provide the opportunity of structuring the therapy session by applying different play roles, which will support the therapeutic process, and specific themes like body experiences.

15. Can you imagine, that you could use part of this assessment profile, or the assessment as a whole within population?

NATURAL MEANING UNITS AND KEY STATEMENTS

I actually believe I use this in my daily life... but it is not structured in the way so that I can use it as an assessment model. Maybe I could, if it was an easier version, then I would like to run it through. But if not, it would be too comprehensive because it is so labor intensive.

Assessment as a whole: No, I just do not believe it. Not because it is not good enough for it but rather because it is so demanding. It is quite simply too comprehensive in light of the time you must spend on it. I also believe that you can obtain a lot of useful information by using parts of the profile.

CONDENSATION

The most serious consideration among the three interviewees is that the VOIAS profile as a whole will be too comprehensive and time consuming to apply in clinical practice, and not because the profile is not adequate enough. There is too much work in it, because it is not something possible to carry out by heart. If it was possible to learn it by heart, then one interviewee would definitely consider applying the VOIAS profile in clinical practice, because as he mentions, he is very inspired by the work, and also inspired to use it in clinical practice with some of his clients.

The interviewees agree that parts of the VOIAS profile could be applied in clinical practice, and they are confident that these alone also would also provide with very useful information.

It is furthermore stated that the employment of the VOIAS profile in clinical practice would depend on the client’s psychological state. One interviewee has the experience of doing this kind of assessment already, but points out that it is not as structured as the VOIAS-profile so it can be used as an assessment profile.

CONSIDERATIONS

It is argued that the reasons for not applying the VOIAS profile as a whole because it will be too time consuming and comprehensive, and not something possible to carry out by heart. This is a good reason for considering
training in how to use and apply the VOIAS profile as a whole.

**Summing up:**
Summing up the general experience is that the employment of the VOIAS profile as a whole is too comprehensive and complex, but parts of the VOIAS profile are considered possible to apply and use. The possibility of applying the profile depends on the individual client.
Chapter 7

7.6 Partial results of and conclusion on the follow-up interviews

The first tryout of VOIAS-1 was carried out by three independent music therapists. In order to evaluate and examine the function of VOIAS-1 as well as its potentials and limitations a follow-up interview of the three music therapists was composed and carried out. The results of the follow-up interview provided concrete elements to be added or corrected in VOIAS-1. In the following the results of the follow-up interview will be presented.

7.6.1 Elements missing in the introduction to VOIAS-1 in general

According to the analysis of the follow-up interviews the three independent music therapists were in need of the following information:

- men and women sound with a difference of an octave
- the construction and employment of VOIAS-1 is based on the intuitive function of listening and perception
- the Likert-scale is approached intuitively
- the assessment and evaluation of a vocal sound is related to what is known that the human voice is capable of projecting.

This information should therefore be added to an introduction of the manual.

7.6.2 Elements to improve instructions for evaluating different parameters more precisely

The instruction in the manual of VOIAS-1 does not clarify where the human voice should be assessed and evaluated more precisely during the intervention of the CoreTone and the CoreToneVolume. It should be added in the instruction for evaluating these interventions that the human voice is to be assessed where the vocal expression is most clear and open during the sounding of exercise.

The evaluation of the parameter loudness in the vocal improvisation can be made less complicated. A less complicated solution would be to only evaluate the maximum of intensity during the vocal improvisation.

7.6.3 Improved edition of the assessment sheets

By mistake all five gradients in the Likert-scale developed for evaluating the parameter loudness were defined (see the manual for VOIAS-1 in Appendix 11). In the Likert-scale of all the other parameters only level 1, 3 and 5 were defined. Therefore the Likert-scale should be developed for evaluating the parameter loudness edited into only defining level 1, 3 and 5 of the Likert scale. Furthermore the Likert-scale in the parameter loudness is unbalanced. There are more soft values than more powerful values. The loudness scale in this study cannot contain a vocal expression of shouting or singing very powerfully and loudly. This should therefore be corrected so that the Likert scale of the parameter Loudness is balanced between soft and powerful values. It should also be considered if the choice of words should be musical or speech oriented.

In chapter 4.6.2 it is described how we as human beings can express ourselves in a wide range of vocal intensities. It is furthermore described how intensity is a degree of loudness (or volume). The interpretation of the parameter loudness/intensity is not only a physiological, acoustical and conceptual factor, it is also psychological and emotional. According to Bonde (2009, pp 251) power can be defined as an overall intensity experience that is linked to concepts such as density, tone and complexity. An option therefore could be to use the word power which can be defined as an evaluation of the quantity or power of the sound produced: a degree of loudness. The graduation of the Likert-scale could then be the following: Very powerful - powerful - without power.

Focusing on the wording in the Likert-scale
of the parameter richness in the assessment sheet as well as in the manual, level 5 in the Likert-scale is defined as very full/rich. This should be edited into very full / very rich. Level 1 is defined as very flat / thin. This should be edited into very flat/very thin.

7.6.4 Elements difficult to approach and evaluate
There were minor difficulties with how to approach the parameter the “Ending ascending glissando”, which gives reason to consider the importance of knowing more about the purpose of the exercise, what information the glissando movement can provide, and the glissando movement as a part of a working method in music therapy. Therefore the conclusion is that this information should be provided during training of how to employ VOIAS-1.

Furthermore there were minor technical difficulties in measuring the pitch having to do with the music therapists choice of instrument to support recording the pitch sounded. As a whole, it turned out that it was difficult to measure and record pitch. In chapter 4.6 it is mentioned that the different intensities in the harmonic series may sometimes cause difficulty in the subjective determination of the pitch (Colton et al. 2006). A solution could be to approach the recording of pitch only objectively.

7.6.4.1 The “body” parameter
The follow-up interviews revealed that there were significant differences in how the vocal parameter Body was experienced by the three music therapists. One music therapist found the parameter easy to approach. Another music therapist stated it was definitely the most difficult parameter, but found the horizontal part of the parameter very easy to adapt to and relate to clinical practice and therapy work. The third interviewee found the parameter complex and difficult to approach, and experienced a need to place more crosses in connection with one sound sample.

The sound samples selected were cut so they only included the performance of the vocal exercise. The vocal quality changes slightly from the beginning to the end, especially if the person is starting sounding with closed mouth. The manual did not mention that the human voice was to be assessed where the vocal expression was most clear and open during the sounding exercise. Therefore it is my conclusion that the need to place more crosses in connection with one sound sample will not be required when this information is added in the manual.

For the measurement of the sound quality of the human voice in relation to a spatial body sensation I compiled two (non-clinical) reference sound-files. These were experienced as more confusing than supporting. When modeling the different vocal qualities during the interview with the music therapist and having the music therapist sound the different vocal qualities, the self-experience immediately supported a better understanding of the parameter. A spontaneous statement was that this parameter only needed training in how to be approached and understood.

This statement is supported by the fact that the parameter was correctly explained and defined by two of the three interviewees to a certain point. In conclusion, the self-experience is necessary in order to measure the human voice in relation to a spatial body sensation and the best way to achieve this is by employing training in how to apply VOIAS-1.

The parameter “body” is experienced on the edge of something else, but at the same time it is experienced as a very important parameter providing information about the client’s state of being.

7.6.5 Important elements missing from the profile noticed as important
The three interviewees did not miss any vocal characteristics. However, all three interviewees missed the possibility of adding subjective descriptions and also options of approaching the assessment qualitatively. The layout of the five different assessment sheets should be changed to enable the addition of short remarks and descriptions to each vocal parameter.

It is furthermore suggested to include a mood-wheel to the profile of VOIAS-1. The purpose of this was to enable a subjective
evaluation of the emotion present in the vocal sound experienced by the music therapist. In chapter 4 (see chapter 4.9.2, pp) about how listening is approached to a spatial body sensation and the quality of the voice, it is described how I have incorporated the mood-wheel in the approach of analysing and understanding the vocal quality projected. To include the mood-wheel as suggested above is not without complications. The music therapist may sense that the person in front of her/him is sad, but what supports this conclusion? It is my personal opinion that the musical analysis in general should guide and support a conclusion of an interpretation.

This conclusion should be discussed with the client in order to ensure that he or she is being met, heard and understood correctly, and in order to take a possible counter-transference into account. The musical analysis therefore also is a tool for what further is addressed in the music therapy treatment. Therefore it is my experience that the suggested employment of the mood-wheel differs from my approach as a whole. The conclusion is that the mood-wheel will not be part of the assessment sheet in the first step of the analysis.

It was stated that the form and structure in singing a well-known song is given. Therefore a possible parameter for evaluating the intervention Song could be to evaluate how the form and structure of the song are carried out. A suggestion could be to focus on fluency in the performance. The constitution of the parameter fluency then should focus on the melody and include that the song is performed naturally, not abruptly and fragmented. The graduation of the Likert-scale could then be the following: Very fluent - quite fluent - not at all fluent.

7.6.6 Does the VOIAS-1 provide data that make change over time evident or visible
The interviewees agree that the analysis of the five different tasks to provide data that make change over time evident and visible.

7.6.7 The function of VOIAS-1 as a whole
There is an agreement about the VOIAS profile being quite clear and complete, and to the complex side, but not too complex. Therefore training in how to approach and practice the VOIAS profile should be considered and planned carefully. Training would furthermore ensure that the approach is homogenous, thus ensuring the applicability of the VOIAS as a reliable instrument.

The follow-up interview revealed that the information a vocal assessment could provide about a client’s state of being, was important to and would be understood by other members of the multidisciplinary team. The three music therapists further discussed how a possible clinical report could be formed based on a vocal assessment. It was made clear that VOIAS-1 offered the opportunity to explain to colleagues about how the interpretation was based on a musical analysis. Thus it was found important to include both music therapeutic and psychological terms and descriptions in the report. Considerations therefore should be given to the sheet providing the results and interpretation of the vocal assessment in the further development of the VOIAS profile.

The three music therapists stated that it would be difficult or unreliable to set a diagnosis based only on the outcome of a voice assessment. However, it is stated that a voice assessment would contribute with important clinical information that would provide perspective to the clinical description of the client. This is supported by a description of how the evaluation of the individual vocal parameters within the vocal improvisation, when related to each other, do not make sense, and instead uncover important information about the client’s state of being. Such a function of VOIAS-1 has value to the interdisciplinary team, the interdisciplinary collaboration about the treatment and in order to set the diagnosis.

The outcome of the analysis is that VOIAS-1 is basically experienced as a tool for the music therapist. There is an agreement among the interviewees that VOIAS-1 will only be applicable to certain client groups; - clients with the ability to reflect, adults looking for personal development or out-patients.
Whether VOIAS-1 can be understood by and is relevant to the client is questionable. To be so, VOIAS-1 should be employed as part of a working method in the therapy process. According to one interviewee the results from the vocal assessment would not be relevant to children and clients suffering from comprehensive psychiatric problems. It is also questioned if it is possible to assess very troubled psychiatric patients at all. However, it is experienced that VOIAS-1 would make sense for the therapist to apply in evaluating the therapy session afterwards. It is furthermore suggested that VOIAS-1 could be applied as a tool for structuring the therapeutic work and encouraging the client. Finally it is suggested that VOIAS-1 may support clients to understand herself/himself better when addressing body experiences connected to vocalisation.

7.6.13 The employment of VOIAS-1 in clinical practice
The VOIAS-1 as a whole is considered too comprehensive and time-consuming to be applied in clinical practice. However, parts of VOIAS-1 could be applicable in clinical practice, and it is clear that these alone also would provide very useful information.

7.6.14 The lay-out of the vocal assessment sheets
In the interviews, the order of the vocal parameters was questioned and it was considered if the order could be different within the assessment sheet evaluating the vocal improvisation. However it should be considered that the function of the manual and the guidelines is aimed at equalising the scoring and evaluation. The best way to build up an assessment routine is also to match the design of the assessment sheets. Therefore the order of the vocal parameter should not be changed.

Summary of the first tryout of VOIAS-1
Three independent music therapists tried out VOIAS-1 for the first time. They were only provided with a manual and the specific assessment sheets of VOIAS-1 to evaluate the sound samples. In order to evaluate and examine the function of VOIAS-1, as well as its potentials and limitations, a follow up interview was carried out.

All in all VOIAS-1 was experienced as quite clear and complete, yet to the complex side and time consuming, but not too complex to apply in clinical practice. The results of the follow-up interviews documented a need for minor corrections and adjustments of the VOIAS-1 in order to make the guidelines clear, precise and complete. The follow-up interviews revealed that the “body” parameter was the most complicated parameter to approach. The follow-up interviews also revealed that the “body” parameter employed an approach and listening attitude easy to adapt to when modeled and described. The inter-reliability of VOIAS-1 can be ensured by implementing carefully planned training in the method. The importance of self-experience to the vocal parameters is supported by the outcome of the follow-up interviews. This will further support an relative to the understanding and approach of VOIAS-1.

Another limitation is that VOIAS-1 is too quantitative and in need of the possibility of adding subjective descriptions.

VOIAS-1 is basically experienced as a tool for the music therapist. There is agreement among the interviewees that VOIAS-1 will only be relevant for certain client groups; clients with the ability to reflect, adults looking for personal development or out-patients.

It is experienced that VOIAS-1 has potentials for providing data that make change over time evident and visible, as well as providing essential clinical descriptions about the client’s state of being, which have value to the interdisciplinary team, the interdisciplinary collaboration about the treatment and in order to set the diagnosis. It is furthermore experienced that VOIAS-1 has potentials for being applied as a tool for structuring the therapeutic work, as well as encouraging and supporting the client to understand herself/himself better.
I have observed this process of psychological growth in its depth and breadth during the development of the tone of the voice. It rests in principle on the deepening of the tone in every sense.

Alfred Wolfsohn 1)

1) Orpheus, or the Way to a Mask. Germany, 1936–1938
8. A psychoacoustic analysis and a psychological interpretation

The outline of this chapter consists of two parts. The first part (chapter 8.1) comprises the different steps taken when looking into the quantitative possibilities of assessment, as well as the considerations and the choices made in selection of psychoacoustic methods.

The second part of this chapter (chapter 8.2 - 8.7) is an examination of the potentials of the objective approach of assessment, VOIAS-2. The design of the examination can, as described in chapter 3, be defined as a sequential transformative design with unequal priority given to the quantitative and qualitative analysis (see figure 1).

In Phase 1 musical data of the performance of five different vocal exercises are analysed psychoacoustically, with attention to different vocal parameters extracted in chapter 7 (see chapter 7.1).

In Phase 2 a theoretical-based framework - a transformative worldview (chapter 4) is utilized to conduct a psychological interpretation of the psychoacoustic analysis in Phase 1.

In chapter 7.1 vocal parameters are extracted and chosen for the objective approach of assessment, VOIAS-2, a psychoacoustic analysis. For each vocal intervention a manual and a protocol for approaching the chosen vocal parameters with a psychoacoustic analysis are developed and described in detail.

The manual for VOIAS-2 can be found in Appendix for chapter 8, USB-memorystick.

The results of the analysis are presented in chapter 8.3 - 8.6. The structure of the overall analysis follows the five different vocal exercises starting with

1) The glissando,

2) The CoreTone and The CoreToneVolume

3) The song

4) The vocal improvisation.

For each vocal intervention a psychoacoustic analysis is carried out, examining selected vocal parameters in relation to each client, starting with AB, BC, DC and then BD. The psychoacoustic analysis is continuously psychologically interpreted. The consequence

Figure 1: The comprehension of the two phase mixed methods design. The upper line is phase 1, the quantitative part, and the line below is phase 2, the qualitative part.
of this is that Phase 1 and Phase 2 do not appear as two distinct parts in this chapter, but appear as ongoing and permanent shifts between the psychoacoustic analysis and the psychological interpretation.

The intention is to give an idea of what a psychoacoustic analysis of the human voice can provide related to the clinical report of the client’s treatment and overall pattern of the therapeutic process. In other words, this should be enough to indicate the clinical relevance of the psychoacoustic analysis. The psychological interpretation is based on chapter 4 “Clinical approach as part of the research method”, the theoretical foundation of my approach to the human voice and therapy.

The literature review, chapter 2, focuses on and highlights how the different vocal parameters are influenced when the person is suffering from depression or anxiety. All together this provides the foundation of the psychological interpretation.

In chapter 8.7 the pattern of the process across the exercises is related to the statistical results of the employment of VOIAS-1. Finally in chapter 8.8 the results from the overall analysis are presented.

8.1 Looking into quantitative possibilities of assessment

In 2005 I attended “The 6th Pan European Voice Conference (PEVOC6): Mirroring The Voice”, which took place in London, England. The PEVOC-conference is multidisciplinary, and addresses those interested in the human voice, and the care of the human voice. It focuses both on fundamental and applied scientific research, and on clinical assessment and treatment. It offers among others international voice researchers, voice therapists, voice teachers, and singers the opportunity to come together and share their knowledge, ideas and experiences.

During this conference the focus was on attending presentations related to perception and assessment.

8.1.1 PEVOC6 and Technology Department of Electronics, University of York, England

The PEVOC6 conference also led me to Prof. David Howard1), who is considered an expert in singing technology and speech synthesis. He is a very dynamic man and researcher who possesses a marked interest in the human voice. He among others organised the PEVOC6 conference in London, United Kingdom.

His main research interests are the human voice, including the analysis and synthesis of singing, speech and music. He has published several articles and books on the subject. Prof. David Howard was contacted for advice in the search for a method to assess the human voice quantitatively with the focus on the vocal exercises in this study. Along with this need, the possibilities of assessing the vocal parameter, timbre, and the voice quality and its relation to emotion, were also discussed.

Relative to software, Howard recommends PRAAT, which is a free scientific software program for analysis of speech in phonetics. It is a program used widely within psychoacoustic research.

Relative to the vocal parameter timbre and about assessing the voice quality changes in relation to emotions, Howard expresses that this was impossible psychoacoustically, and states that nothing could replace the human ear, and what we as a human beings can hear and sense in the human voice.

In his article “Psychoacoustically informed spectrography and timbre” he writes, that “Pitch and loudness are subjective aspects of sound which can be described in terms of the observed abilities of subjects to rate them on a scale from “low” to “high”. Timbre is a subjective aspect of sound for which there is no such scale and neither qualitative nor quantita-

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1) Prof. David Howard is head of the Academic and Research Staff of the Department of Electronics at The University of York, United Kingdom. His main research interests are the analysis and synthesis of singing, music and speech, particularly with respect to finding out more about naturalness in sound reproduction, pitch shift in cappella singing, the effect of voice training and making use of analyses informed by knowledge of the hearing system.
tive descriptions are generally found that are widely accepted” (Howard and Tyrrell 1997, pp 65). Further he states that “timbres are often made on the basis of giving a position between two extremes, such as bright and dark, or brilliant and dull” (Howard 1997, pp 70 / Howard & Angus 2006, pp 229).

The meeting with Howard did not solve how timbre could be measured, but introduced the software programme PRAAT. However the discussion and the meeting with Howard were very inspiring and encouraging.

A small remark in connection with how to approach analysis of sound files with a software programme would make a great difference to me, which will be revealed in the following.

8.1.2 The software-program: PRAAT

PRAAT is a Dutch word for talk, but it is also the name of a free scientific software programme for the analysis of speech in phonetics. It has been designed by Paul Boersma and David Weenink from the Institute of Phonetic Sciences, at the University of Amsterdam, The Netherlands. The program is constantly being improved and updated. The version I have used in this study is Version 5.1.25.

It can be run on a wide range of operating systems, including Macintosh and Microsoft Windows (Boersma & Weenink 2010).

To use software for analysing the human voice, like the PRAAT-programme, it is necessary to know the elements of voice production, and go into the field of psychoacoustics and voice analysis in order to understand what PRAAT can reveal about the human voice in the analysis.

PRAAT expanded my approach to the human voice, where I started to experience it in physical terms. This means hearing the sound, instead of listening and sensing it, and not least looking at calculations, contours and graphs of the sound. This whole objective approach also had to do with learning a software programme, which was very different from how the computer normally was used.

At one point Howard advised me encouragingly on how to approach this “unknown land” / field of knowledge in assessing the voice, bearing in mind that it is a search for something which makes the process in music therapy visible and easy to clarify to a multidisciplinary team.

He advised me that the best way to approach PRAAT and assess the human voice with PRAAT, is to play around with the software, study and watch the pictures computed, then I might suddenly see what I am looking for. If I see “it” I would know.

So the first step is to learn the PRAAT-programme by playing around with it, making all kinds of commands, looking at differences, and comparing the results with my sensation of the client’s voice being measured and the clinical experience of the client.

At the same time I would constantly ask if what I see would make sense to people who do not know anything about acoustics, without too many explanations. And would what I see help these people to understand the client and the client’s state of improvement.

In my search I was looking for something where the computation / picture or figures talked a clear language by themselves.

In this study PRAAT is the primarily software being used in assessing all five exercises. And in using the PRAAT for this study I make individual adjustments to the exercises, and to the participants. This in each case is explained and defined in more detail as the analysis is carried out.

8.1.3 Printing and illustrating from PRAAT

While studying the improvisation in PRAAT for analysing it comes to a point where it is quite frustrating not being able to get an overview of the improvisation if it lasts more than 30 seconds. A first step therefore is to print out PRAAT Pictures and put these pictures together as a puzzle to provide this overview.

When the improvisation appears in its full length it confirms how important it actually is to be able to see the improvisation in its full
length, and not only study the improvisation as parts of a whole, at the same time as being able to go into detail if there is something which catches the eye.

Bearing in mind that the results and interpretations of an analysis are to be communicated to an interdisciplinary team, and considering how this could be done, I concluded at this point that the visual experience of the whole improvisation could be very supportive.

I never succeeded in finding a way of having PRAAT present the improvisation so it could provide me with the same clear experience as when I printed the improvisation out in pieces of 30 second pr. window and put them together as a puzzle. I did succeed in squeezing the whole improvisation into one frame, but this version did not support the disseminating of the clinical information, which the vocal improvisation could provide.

Therefore I mentioned this need to the graphic designer of this dissertation, Ole Wich, and he took a closer look at what kind of files PRAAT produces for printing and presenting the data analysis. It was then revealed that PRAAT produces vector-files. A vector file is scalable and can therefore be enlarged or made smaller without losing any data of how the analogue blue line, the pitch contour or the formant contours of a sound file appears. This ensures the scientific validity when presenting the sound-files in illustrations. In this study the computation of the vocal improvisation is therefore constructed by allowing the graphic designer put several frames together.

PRAAT is primarily developed out from a psychoacoustical need. As music therapists the needs may be slightly different when it comes to both analysing the data objectively and presenting the data analysis.

8.1.4 Centre of Excellence in Music Research, University of Jyväskylä, Finland

Looking into the field of music therapy in order to identify quantitative possibilities of assessment, I at one point was encouraged to make contact to Finland where the MIR toolbox was developed and among other things used for analysis of clinical improvisations. I contacted the Finnish researchers, because one of the five exercises in this study is a clinical improvisation, and because I still had some ideas to look into in the endeavouring to measure the vocal parameter timbre.

In Jyväskylä, the music therapy Master’s Degree programme is connected to the Master’s Degree programme within Music, Mind and Technology. The programmes have collaborated with Aalborg University for many years. The department of music led me to Prof. Tuomas Eerola. 2)

At the time when the possibilities of applying the MIR toolbox for evaluating vocal improvisations in this study (September 2009) were investigated, the MIR toolbox was only applicable for evaluating musical improvisations, not vocal improvisations. However the MIR toolbox could approach the vocal parameter timbre of one single tone from different singular perspectives like spectrum, brightness, spectral centroid and spectral spread, but not as a whole.

These were explored and the computations of the different parameters were studied and constantly related to the therapeutic process of the client, and my own clinical sensation and experience of the human voice in each case. Intentionally, the computation of the psychoacoustic analysis should make sense to the interdisciplinary team without too many explanations and support the dissemination as well as the clinical description of a client’s state of being.

When the computation of spectrum was presented it immediately provided a variety of information which could be easily related to the experience I had of the client sounding the CoreTone. It presents the amount of overtones and the intensity of the overtones. The structure of the computation of the overtones also provided me with essential information which clearly supports the subjective experience of the sound as well as the therapeutic process.

2) Prof. Tuomas Eerola has an interest in music perception, focusing on melodic similarity, melodic expectations, metre perception, as well as an interest in different areas within music and emotions such as: emotion model and processes; and timbre and acoustical features.
The descriptor spectral centroid is related to salient dimensions of timbre or their acoustic correlates. Spectral centroid (amplitude-weighted mean frequency of the spectrum energy) is reported as a major determinant of timbre (e.g., Grey, 1977; Krumhansl, 1989; McAdams et al., 1995; Samson et al., 1997; Lakatos, 2000; Marozeau et al., 2003). Low spectral centroid indicates dark timbre and high centroid is often interpreted as bright timbre. Therefore the parameter mir-brightness, which focuses on how bright a sound is, is excluded. Other proposed acoustic correlates of timbre dimensions consist of such spectral dimensions as spectrum fine structure (Krimphoff et al., 1994) and spectral spread (Marozeau et al., 2003). Spectral spread is the dispersion of the spectrum (standard deviation), which is often used to describe richness of the spectrum. However, spectral spread is excluded. In studying the parameter and starting the analysis it reaches a point where it is difficult to make sense of the analysis when related to clinical practice. This gives reason to explore and examine the parameter further in a collaboration with the Department of Music.

As mentioned in chapter 7.1 the vocal parameters calculated and measured by Prof. Toumas Eerola are the following in connection with the CoreTone and CoreToneVolume intervention: 1) spectrum, and 2) spectral centroid. For the vocal intervention Song the vocal parameters are only spectral centroid.

For Eerola’s psychoacoustic analysis he is provided with isolated clips 3 seconds long cut from the sound samples analysing the single tone according to where the vocal expression is most clear and open during the sounding of exercise. For the psychoacoustic analysis of the exercise Song a specific note is chosen in the song “Happy Birthday” to be analysed. In the first line of the song going “Happy birthday to you….” The tone where you sing “you” is chosen for all the participants.

I made all the actual selection of the isolated audio clips was made by me, and Eerola screened the files and eliminated artifacts. Sampling rate was set to 22050 and the signal amplitude was normalized for timbre-related descriptors. The parameters were calculated with a version 1.1 of MIRtoolbox (Lartillot & Toiviainen 2007).

8.2 An introduction to participants

In chapter 6.2 the recruited participants are presented with the very basic information. Now follows a more detailed presentation of each client, in order to enable a psychological interpretation related to the psychoacoustic analysis of the sound samples and the therapeutic process carried out in chapter 8.3 - 8.6.

In the presentation of the participants the focus is on giving a general and briefly sensation of the therapeutic process, the reason for being referred to music therapy, and if they got any medication while receiving music therapy.

All in all this is a concise description of each client and the therapeutic process. In order to keep the participants as anonymous as possible, I have changed the initials in the text here to AB, BC, DC and BD.

The presentation of BC may be a little more detailed. As presented in chapter 6.2 BC has been offered music therapy before and also has a background including vocal training, both defined as criteria for exclusion.

AB is a woman in her late twenties, who is married and has two children. After giving birth to her first child AB received a postpartum depression. This was treated with anti-depressiva. AB took the medicine for 4 ½ years. During the summer 2007 it was discovered that AB’s father had severe cancer, and then AB received a recidivate depression. At first medical treatment was tried out, but without success, and therefore her doctor referred AB to Psykiatriski Depilin in the spring 2008. Here she was diagnosed as severely depressed and severely suffering from anxiety. She had six sessions with a psychologist. Because the psychologist stopped working at the department, and because of this research study focusing on depression. AB was referred to music therapy. AB had not received vocal training or music therapy before.
The music therapy treatment part of this study was running over nine months. The therapeutic process improved until the 6th session. Then there was a pause in the music therapeutic treatment for two and a half months due to my sick leave from work. This caused disturbance to the therapeutic treatment process. Because of this pause AB was invited to a verbal follow-up session, and then in the following session, the seventh, the second assessment was carried out. In the seventh session it was furthermore revealed that AB’s state of being had deteriorated during the pause, and AB’s state of being seemed even worse than in the first session. As the work started up again AB recovered.

AB received anti-depressive medicine, which after the seventh session was changed due to the long time she had taken the same medicament. AB was furthermore subject to a triangulation carried out in chapter 9 in order to examine the validity and reliability of the psychological interpretation of the measured vocal parameters.

BC is a woman around 40 years old. She lives together with her husband and two children. She was hospitalised for the first time in her life with a very severe depression with psychotic symptoms.

BC was referred to music therapy while hospitalised and improvisation on piano was the only method used. When referred to music therapy BC did not suffer from psychotic symptoms anymore, but she did not speak much, and was suffering severely from anxiety and the depression.

A year after, BC was sent home and received all further treatment as an outpatient. At this time we had a conversation about continuing the music therapy treatment or stop. During this conversation BC was able to express her needs and considerations about her voice being creaky and not reliable in function. It clearly was not because of a cold, or a sore throat, and it was the first time BC verbally expressed a consideration about her physical symptoms being caused by her psychological state of being.

BC is vocally experienced, and has among others received vocal training within The extended vocal training technique (Vocal training method described in chapter 4.1) as part of her work, just as I have, but by other trainers within this field. She has training and a work position where voice work is essential, and her dream was to be able to work again. The conversation ended with the decision that BC should continue the music therapy treatment, but now focusing on Psychodynamic Voice Therapy as a working method.

At this stage BC still had difficulties putting her feelings and inner experience into words, and though her depression and anxiety was less, it was still severe. BC at this stage received a full disability pension.

The music therapy treatment part of this study ran over half a year. Between the ninth and tenth sessions I unfortunately got very sick, and there was a pause in the treatment for two and a half months.

Just before the last music therapy session and the last assessment BC for the first time for a couple of years took part in a week course connected to her work. Though she was tired after this course she also experienced it as a success in that she managed to complete the course, and take full part in it. This was her first step towards returning to her employment position.

At the end of the music therapy treatment BC also was able to put feelings and inner

<table>
<thead>
<tr>
<th>DC’s 10 point Visual Analogue Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety = 4 decreasing to 3</td>
</tr>
<tr>
<td>Lack of concentration = 5 decreasing to 3</td>
</tr>
<tr>
<td>Mental energy = 3 improving to 6</td>
</tr>
<tr>
<td>Appetite = 1 improving to 6</td>
</tr>
<tr>
<td>Physical energy = 5 improving to 7</td>
</tr>
<tr>
<td>Memory = 4 improving to 5</td>
</tr>
<tr>
<td>Affected by the weather = 7 decreasing to 5</td>
</tr>
</tbody>
</table>

Table 1. DC’s 10 point Visual Analogue Scale
experiences into words, and a verbalisation about what might have caused the severe anxiety and depression outbreak was revealed. The music therapy treatment continued.

Medical treatment: anti-depressive, anti-psychotic, and anti-anxiety medicine.

**DC** is a man in the beginning of his forties. He lives alone, but has been married a couple of times and has four children, most of them adults. He was hospitalised after a suicide attempt and diagnosed as severely depressed. DC was referred to music therapy because the psychologists at the hospital knew him personally. The music therapy treatment part of this study was running over five months. DC had not received vocal training or music therapy before.

In the second session the individual sufferings of DC were identified and a 10 point Visual Analogue Scale (VAS) was constructed. DC marked on the line the point that he felt represented his perception of his current state (see table 1). In the last assessment DC again marked on the line the point that he felt represented his perception of his current state. The process is described as either decreasing or improving in table 1. Around the sixth session DC experienced his depression at its worst, and was impatient about his state of being because it had lasted around nine months. Therefore DC was offered more anti-depressive medicine. Close to the ending of the last assessment he was starting to feel better, and the staff around him also had this experience. However, a week after the last vocal assessment had been carried out DC's state of being turned manic, and he was diagnosed as suffering from a bipolar disorder and not a unipolar depression. The music therapy treatment continued.

Medical treatment: first anti-depressive, then in the treatment of the bipolar disorder.

**BD** is a man in the late 30's and living alone. He was suffering from severe depression, and was for some time offered individual therapy by a psychologist. BD was referred to music therapy, because he had difficulties in putting feelings and inner experiences into words, and it was assumed that this was caused by the severe depression with psychotic symptoms. Later when the depression became mild, another diagnosis, autism, was revealed. This occurred between the second and the last assessment.

The music therapy treatment was running over two months. BD had not received vocal training or music therapy before. BD steadily recovered, but it never came to a point where he started to speak fluently about his state of being. However, he reported that he found great support in the CoreTone exercise, which he had applied at home before going to sleep. The music therapy treatment stopped shortly after the last assessment.

Medical treatment: anti-depressive, anti-psychotic medicine.

### 8.3 The analysis of the Glissando

As mentioned in chapter 7.1.2.1 the analysis of the glissando movement as a whole is undertaken by analysing four parameters:

- **Calculating the pitch range**
- **Comparing maximum pitch reached in the ascending glissando with maximum pitch reached when starting the descending glissando**
- **The ending of the ascending glissando**
- **Time based analysis of sung glissando**

All measurements and calculations are carried out in PRAAT. A manual and a protocol for approaching the chosen vocal parameters with a psychoacoustical analysis is developed and described in detail. This manual is to be found in appendix for chapter 8, USB-memorystick). In the following I will shortly present a few guidelines on how the parameter is related to my clinical experience and theoretical knowledge. This is followed by an analysis of the open glissando movement, starting with AB, BC, DC and BD.
1. Analysis of Parameter 1: Calculating the pitch range
It is my clinical experience as well as theoretical knowledge that the pitch range very often is affected by the state of being, in the sense that both anxiety and depression often influence the pitch range to become narrow and limited (see chapter 4.7.1.3).

When calculating minimum and maximum pitch of the ascending and the descending glissando the pitch range is reported by the lowest possible frequency the client is sounding and the highest possible frequency the client is sounding.

2. Analysis of Parameter 2: Comparing the highest pitch reached in the ascending glissando with the highest pitch reached when starting the descending glissando
My assessment and clinical experience suggests that the starting point of the descending glissando may be influenced by the client’s state of being in the sense that it influences the subjectively experienced and felt energy. The consequence of this affects the ability of the client when starting the descending glissando to “lift” their sound to a point that is similar to, or the same as, the pitch they reached at the end of the ascending glissando. This also involves the use of imagery, imagining starting high on the scale for the descending glissando (see chapter 4.7.1.3).

3. Analysis of Parameter 3: The ending of the ascending glissando
Sometimes the moment of stopping the vocalisation of the ascending glissando results in different vocal characteristics like a small descending movement. The result of this small descending movement does not always have the consequence of a change of pitch. However, when these movements last more than one second, and there is a difference of several steps (pitches) between the highest reached pitch and the ending pitch, they are considered as a difficulty in letting go of the ending pitch (see chapter 4.5).\(^3\)

It is my clinical experience that important information can be obtained by listening carefully to the sound quality, and observing and describing how the client lets go. The sounding quality very often shows or reveals something new, very vulnerable, an authentic or important aspect of the client’s Self, and state of being. This is also important information which acts as a guideline for the therapeutic actions as a music therapist.

In studying the ending pitch it is important to bear in mind that the instruction and play rule for the exercise is to let go of the ascending glissando (the heavy burden) when the client reaches the highest possible note they can sing. And it is important to remember that the exercise is modeled by the music therapist once alone, and twice together with the client, supported by an explanation with instructions.

The exercise as a whole is influenced by the imagery to support a feeling of movement in the body and voice.

4. Analysis of Parameter 4: Time based analysis of the sung glissando
This analysis is concerned with calculating the length of time (in seconds) taken for the ascending and descending glissando, and the breathing in between the ascending and descending glissando.

It is my clinical experience as well as theoretical knowledge (see chapter 4.5), that the duration of sounding and breathing is affected by the state of being, in the sense that anxiety and depression often affect the breathing so it becomes short, shallow or rapid, and this in turn can affect the sounding duration.

It is my clinical experience that the more focused and relaxed the body is during the exercise the more the natural reflexes for breathing will be active. This means that when you have emptied your lungs, a reflex will immediately result in inspiration, which will cause the filling up of your lungs. It is my clinical experience that breath control and breathing quality and style are closely connected to one’s state of being. For example, when the body is tense, one will have more difficulties in vocalising for very long. The nature and flow in the exercise as a whole is also very much connected to breath.

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\(^3\) See chapter 4.7.1.3 for how the exercise is carried out.
control. As an example the breathing duration can be quite long and prohibit the flow of the glissando movement as a whole.

Before starting the analysis of the glissando, all the glissandi from the three assessments for each client are presented as raw sound-files in one illustration. A raw sound-file is the Praat Picture of a glissando-movement, as it looks when it appears in the Praat Picture window for printing. The Praat Picture window shows all artifacts as well as the pitch contour, the analogue line. To differ the assessments from one another the analogue line in the first assessment is coloured blue, in the second green and in the last assessment red. A pitch scale is presented to the left of the pitch contour, and in the bottom of the picture the duration of the sounding as well as the breathing are marked.

During the presentation of the results of the analysis the artifacts are removed and only the most important information is left in the picture.

**Artifacts**

Sometimes the client makes uncontrolled sounds like cracks, or some unidentified noises can occur in the space during vocalising. These may be defined as *artifacts*. The recording contains all the sounds. When PRAAT reads the recordings the artifacts will appear in the SoundEditor window as small blue lines beside the pitch contour of the tone. These artifacts are not always audible. Most often they will appear in other frequency levels, which clearly is very different from the frequency of the tone.

However, artifacts can also be a sudden sound coming from the Vocal tract which just for a milisecond makes the voice crack, and then the artifact is visible close to the pitch contour, but makes a clearly sudden movement up or down in pitch, which in a calculation will affect the result. A recording including noises from the music therapy room will appear as artifacts in the reading of the sound-file, which radically affects the mean pitch measured by PRAAT. In those cases where the voice is constantly varied and unstable instead of commanding a computation of *Get pitch*, it is possible to command a computation of *Pitch listing*. The *Pitch listing* information will pop up in the same way – in a box listing all the frequencies in the period of time defined. Then it is possible to determinate the lowest and highest pitch produced, notate these as well as the mean pitch. Therefore it is important to exclude these artifacts in the calculation of the fundamental frequency.

Following every single step in the psychoacoustic analysis is the psychological interpretation. The conclusion and interpretation of the small movements within each single parameter is described as either *improving* or *deteriorating*. As mentioned earlier this is a conclusion based on chapter 4 “Clinical approach as part of the research method”, my theoretical foundation of my approach to the human voice and therapy. The literature review, chapter 2, focuses on and highlights how the different vocal parameters are influenced when the person is suffering from depression or anxiety. All together this provides the foundation of the psychological interpretation.

Finally, this is followed by a summary and interpretation of the process as a whole of the vocal exercise related to the clinical report presented in the introduction of the client in chapter 8.2.
Figure 2: A picture presenting the computation of AB’s performance of the glissando movement in the 1., 2. and 3. assessment including artifacts, as well as presenting the breathing and sounding duration for the three assessments.
8.3.1 AB: Analysis of Glissando

1. Analysis of Parameter 1: Calculating the pitch range

Introduction to the analysis of parameter one: A table gives the range of frequencies vocalised by the client in the exercises at specified time. The first column lists the initials of the client and the three assessments. In the second column the minimum frequency the client sang is recorded, and in column three maximum reached frequency the client sang is presented. The ending frequency of the ascending glissando vocalised by the client is recorded in column four of the table. When giving sound to a descending glissando the same pattern seems to appear, but in a variation. When starting singing the highest possible note to a given sound, there seems to be a small ascending movement over short time (around 0.10 Sec.), from the very first sound to where the client actually sings the highest note. The difference between the exact starting frequency and the highest sounded frequency is so small that there is no change in pitch. In this study the focus is on what highest possible frequency the client is sounding, and this will be recorded in column five.

In column six the lowest frequency the client reaches and sounding is recorded, and again here at the end there seems to be a small ascending movement over just a short time before actually stopping giving sound. Again the focus is on the lowest frequency possible giving sound.

Together with the accurate frequency measured, the pitch is written and the scientific name is determined; - the note equivalent to the measured frequency value in the English/American standard. For this purpose I have used a table from “Acoustics and Psychoacoustics” (Howard & Angus 2006, pp 151). In each case the name is chosen according to which note the fundamental frequency is closest in frequency. All differences and movements in pitch will be calculated in semitones.

Finally the whole analysis is summarised ending with a conclusion and interpretation based on chapter 4 “Clinical approach as a research method”.

This procedure will be followed also in the analyses of the three other clients.

The ascending glissando

In the first assessment AB’s ascending glissando starts at F#3 and reaches F#5, a pitch range of 25 semitones (see table 2).

In the second assessment AB’s ascending glissando also starts at the same pitch as in the first assessment F#3, and reaches the same pitch as in the first assessment F#5, and therefore also indicates a pitch range of 25 semitones (see table 2).

In the last assessment AB’s ascending glissando starts at G3, one semitone higher than in the second assessment, and reaches F5, one semitone lower than in the second assessment. A pitch range decreases by two semitones, and has a pitch range of 23 semitones (see table 2).

In summary: The pitch range is the same in the first and second assessment, and is larger than the last assessment. In the last assessment the ascending glissando decreases by two semitones.

The descending glissando

In the first assessment AB’s descending glissando starts at C#5 and reaches F#3, a pitch range of 20 semitones (see table 2).

In the second assessment AB’s descending

<table>
<thead>
<tr>
<th>AB</th>
<th>Minimum pitch/Hz</th>
<th>Maximum pitch/Hz</th>
<th>Ending pitch/Hz</th>
<th>Maximum pitch/Hz</th>
<th>Minimum pitch/Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>187.36 (F#3)</td>
<td>740.11 (F#5)</td>
<td>693.44 (F5)</td>
<td>564.09 (C#5)</td>
<td>187.86 (F#3)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>181.41 (F#3)</td>
<td>750.34 (F#5)</td>
<td>718.50 (F5)</td>
<td>560.87 (C#5)</td>
<td>191.76 (G3)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>191.01 (G3)</td>
<td>685.81 (F5)</td>
<td>682.05 (F5)</td>
<td>596.68 (D5)</td>
<td>192.05 (G3)</td>
</tr>
</tbody>
</table>

Table 2. The calculation of the frequency / Hz (Pitch) of AB.
Figure 3: The highest Hz (pitch) of the ascending glissando in the first, the second and the third / last assessment of AB.

Figure 4: The highest Hz (pitch) of the descending glissando in the first, the second and the third / last assessment of AB.
glissando also starts at C#5, but this time ending at G3, one semitone higher than in the first assessment. A pitch range increases by one semitone and has a pitch range of 21 semitones (see table 2).

In the last assessment AB’s descending glissando starts at D5, one semitone higher than in the first and second assessment, and ends at G3, the same pitch as in the second assessment. A pitch range decreasing by one semitone from the second to the last assessment and having a pitch range of 20 semitones (see table 2).

In summary:
The pitch range increases by one semitone from the first to the second assessment, and decreases by one semitone from the second to the last assessment, which has the same pitch range as in the first assessment.

Comparing the pitch range of the ascending and descending glissando:
In the first assessment the descending glissando is 5 semitones smaller than the ascending glissando, but ending at the same pitch as when she started the ascending glissando.
In the second assessment the descending glissando is 4 semitones smaller than the ascending glissando, and ending one semitone higher than when she started the ascending glissando.
In the last assessment the descending glissando is 3 semitones smaller than the ascending glissando, and ending at the same pitch as when she started the ascending glissando.

Conclusion and interpretation of the process:
The pitch range of the ascending glissandi decreases over time, and the descending glissando ends up having the same pitch range in the last assessment as she had in the first assessment.
The difference between the ascending and descending glissando however decreases semitone by semitone over time, illustrating a small steady improvement.
AB is in the second assessment ending the descending glissando a semitone higher than she started the ascending glissando, and in the last assessment ending at the same pitch as she started the ascending glissando. As such, the process can be described as neither improving nor deteriorating.

2. Analysis of Parameter 2: Comparing the maximum pitch reached in the ascending glissando with the maximum pitch reached when starting the descending glissando.

Introduction to the analysis of parameter two:
First an analysis of the highest pitch reached in the ascending and descending glissando is made. Then follows an analysis comparing the highest pitch from the ascending and descending glissando.
Finally the whole analysis is summarised ending with a conclusion and interpretation based on chapter 4 “Clinical approach as a research method”.

The ascending glissando
As Figure 3 shows AB reaches a frequency determined as F#5 as the highest pitch in the ascending glissando in the first assessment. In the second assessment AB reaches a frequency determined as F#5, which is the same pitch as in the first assessment (see Figure 3).
In the last assessment AB reaches a frequency determined as F5, which is one semitone lower than in the second and first assessment (See Figure 3).

The descending glissando
As pictured in figure 4 AB reaches a frequency determined as C#5 in the descending glissando in the first assessment (see figure 4). In the second assessment AB reaches a frequency determined as C#5, which is the same pitch as in the first assessment (see figure 4).
In the last assessment AB reaches a frequency determined as D5, which is one semitone higher than in the second and first assessment (see figure 4).

Comparing the highest pitch from the ascending and descending glissando.
In the first and second assessment the descending glissando is five semitones lower than the ascending glissando.
In the last assessment the descending gliss-
sando is three semitones lower than the ascending glissando.

**Conclusion and interpretation of the process:**
AB performs the highest pitch in the first and second ascending glissando, and is one semitone lower in pitch in the last assessment. The descending glissando however reaches one semitone higher in the last assessment than in the first and second assessment. The difference between the ascending and the descending glissando decreases from the second to the last assessment. Because the highest pitch in the descending glissando gets higher, and the difference between the ascending and descending glissando decreases from the second to the last assessment, the process can be described as slightly improving over time. The process of improvement occurs between the second and the last assessment.

3. Analysis of Parameter 3: The ending pitch related to the highest reached pitch in the ascending glissando

**Introduction to the analysis of parameter three:**
First an analysis of the ending pitch in the ascending glissando is made, and then follows an analysis of the ending pitch in the ascending glissando related to the highest pitch reached in the ascending glissando. Finally the whole analysis is summarised ending with a conclusion and interpretation based on chapter 4 “Clinical approach as a research method”.

**The ending pitch in the ascending glissando:**
In all three assessments AB ends the ascending glissando at a frequency determined as F5 (see figure 5)

**Relating the ending pitch with the highest pitch in the ascending glissando:**
In the first and second assessment AB reaches a frequency determined as F#5 as the highest pitch, and lets go of the ending pitch of the
ascending glissando at F5, which is one semitone lower in pitch. In the last assessment AB reaches F5 and lets go of the ending pitch at F5, making no difference between the highest and the ending pitch in the ascending glissando.

**Conclusion and interpretation of the process:**
AB has no difficulties in letting go of the ending pitch, and this is good. In both the first and second assessment AB lets go of the ending pitch one semitone lower than the highest reached pitch, and then shows a pattern for how AB lets go of the ending pitch. In the last assessment however AB manages to end her ascending glissando at the highest reached pitch. Therefore it can be concluded that AB improves a little from the second to the last assessment.

4. Analysis of Parameter 4: Time based analysis of sung glissando

**Introduction to the analysis of parameter four:** The table gives the duration in seconds of the ascending and descending glissando vocalised by the participant. The first column lists the name of the participant and the three assessments. The second column shows the duration of the ascending glissando, and the third column shows the duration of the descending glissando. The fourth column shows the duration of the ascending and descending glissando in total. The last column, the fifth column, shows the duration of the breathing between the ascending and descending glissando.

First an analysis of the duration of both the ascending and descending glissando is undertaken, then follows the analysis of the duration of the breathing between the ascending and descending glissando. Finally the whole analysis is summarised ending with a conclusion and interpretation based on chapter 4 “Clinical approach as a research method”.

**The ascending glissando:**
The ascending glissando decreases by 0.16 second from the first to the second assessment, and decreasing even further by 0.21 second from the second to the last assessment (see table 3).

**The descending glissando:**
The descending glissando increases by 0.36 from the first to the second assessment, and even further 0.60 second from the second to the last assessment (see table 3).

**The duration of the ascending and descending glissando in total:**
The glissando from the first assessment is in total the shortest, and increases by 0.20 second from the first to the second assessment increasing even further 0.30 second from the second to the last assessment (see table 3). The glissando in total from the last assessment is the longest of the three assessments. The first and second descending glissando is shorter than the ascending glissando, and the last descending glissando is longer than the ascending glissando.

**The duration of breathing between the ascending and descending glissando:**
The breathing increases by 0.66 second from the first to the second assessment, but decreases by 1.16 second in the last assessment, and is 0.50 second shorter than the first assessment, which then makes it the shortest duration of breathing of the three assessments (see table 3).

**Conclusion and interpretation of the process:** The duration of the ascending glissando decreases from the first to the last assessment. The duration of the descending glissando increases from the first to the last assessment.

<table>
<thead>
<tr>
<th>AB</th>
<th>Ascending/Sec.</th>
<th>Descending/Sec.</th>
<th>Total/Sec.</th>
<th>Breathing/Sec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>3.06</td>
<td>1.98</td>
<td>5.04</td>
<td>3.96</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>2.90</td>
<td>2.34</td>
<td>5.24</td>
<td>4.62</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>2.69</td>
<td>2.94</td>
<td>5.63</td>
<td>3.46</td>
</tr>
</tbody>
</table>

Table 3: AB - Time based analysis of sung glissando
The duration of the ascending and descending glissando in total increases from the first to the last assessment.

The duration of breathing between the ascending and descending glissando increases from the first to the second assessment, and decreases from the second to the last assessment, and is shortest in the last assessment. But the duration of breathing is all in all quite long, which clinically leads me to consider that AB is not giving in to a spontaneous performance of the glissando, but maybe concentrating too much on each step in the glissando movement as a whole. All in all the process can be described as improving slightly from the second to the last assessment, because of the process of the descending glissando, and because the breathing between the ascending and descending glissando decreases from the second to the last assessment. However, the process can be described as deteriorating slightly from the first to the second assessment cause to the duration of breathing.

**Summary and interpretation of the process as a whole**

Table 4 gives an overview of the conclusion and interpretation of the process according to the four parameters of the glissando. Taking a look at the first parameter, the process of AB can neither be described as improving nor as deteriorating. In the following three parameters AB's process can be described as neither improving nor deteriorating from the first to the second, but can be described as improving from the second to the last assessment. In the fourth parameter (the time based analysis) the process can be described as deteriorating from the first to the second, and further improving from the second to the last assessment. In summary, the small improvements presented here occur between the second and the last assessments and over time from the first assessment to the last assessment.

Clinically this leads me to consider that AB is holding back, and not giving totally in to the exercise, thus ending up preventing herself from the full benefit from the exercise. It also leads me to think that AB is a person who needs more time to build up trust in the method and in the therapist (me), or that she has a need for perfection.

The duration of breathing between the ascending and descending glissando is quite long, prohibiting the glissandi from being sounded in flow. This leads me to consider that AB is not giving in to a spontaneous performance of the glissando, but maybe concentrating too much on each step in the glissando movement as a whole.

My general understanding and approach are that grounding is a basic condition that must be established before the client is challenged. If the exercise provokes too much it may cause a deterioration in the state of being, and definitely challenge the basic trust in the music therapist.
The analysis of the three other participants is presented in the same format as used above. Therefore the method and rationale for each parameter is not repeated for each participant.
Figure 6: A picture presenting the computation of BC’s performance of the glissando movement in the 1., 2. and 3. assessment including artifacts, as well as presenting the breathing and sounding duration for the three assessments.
8.3.2 BC Analysis of Glissando

1. Analysis of Parameter 1: Calculating the pitch/phonational range

*The ascending pitch range*
In the first assessment BC’s ascending glissando starts at F#3 and reaches E5, a pitch range of 23 semitones (see Table 5).
In the second assessment BC’s ascending glissando starts at F3, one semitone lower than in the first assessment, and reaches G#5, four semitones higher than in the first assessment. A pitch range increasing by five semitones from the first to the second assessment, and having a pitch range of 28 semitones (see Table 5).
In the last assessment BC’s ascending glissando starts at F#3, one semitone higher than in the second assessment, but at the same pitch as in the first assessment, and reaching D#5, which is five semitones lower than in the second assessment, a pitch range decreasing by six semitones, and having a pitch range of 22 semitones (see Table 5).

*In summary:*
BC performs the widest ascending glissando in the second assessment.
BC’s ascending glissando in the last assessment is one semitone smaller than the ascending glissando from the first assessment, and therefore the smallest ascending glissando of the three assessments.

*The descending pitch range*
In the first assessment the descending pitch range starts at C#5 and reaches F3, a pitch range of 21 semitones (see Table 5).
In the second assessment the descending pitch starts at F5, four semitones higher than the in the first assessment, and reaches D#3, two semitones lower than in the first assessment, a pitch range increasing by six semitones from the first to the second assessment, and having a pitch range of 27 semitones (see Table 5).
In the last assessment the descending pitch range starts at D#5, two semitones lower than in the second assessment, and reaches D#3, reaching the same pitch as in the second assessment, a pitch range decreasing by two semitones from the second to the last assessment and having a pitch range of 25 semitones (see Table 5), two semitones smaller than the second assessment.

*In summary:*
BC performs the widest descending glissando in the second assessment.
The descending glissando from the last assessment is four semitones wider than the descending glissando from the first assessment, and therefore the descending glissando from the first assessment is the smallest descending glissando of the three assessments.

Comparing the pitch range of the ascending and descending glissando:
In the first assessment the descending glissando is two semitones smaller than the ascending glissando, and ending the descending glissando one semitone lower than where she started the ascending glissando.
In the second assessment the descending glissando is one semitone smaller than the ascending glissando, and ending two semitones lower than where she started the ascending glissando.

In the last assessment the descending glissando is three semitones larger than the ascending glissando, and ending the descending glissando three semitones lower than where she started. The descending glissando from the last assessment is also two semitones lower than the ascending glissando.

<table>
<thead>
<tr>
<th>BC</th>
<th>Lowest pitch/Hz</th>
<th>Highest pitch/Hz ( Pitch)</th>
<th>Ending pitch/Hz</th>
<th>Highest pitch/Hz</th>
<th>Lowest pitch/Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>180.60 (F #3)</td>
<td>673.55 (E5)</td>
<td>380.53 (F#4)</td>
<td>551.78 (C #5)</td>
<td>178.37 (F3)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>172.83 (F3)</td>
<td>826.20 (G#5)</td>
<td>735.85 (F#5)</td>
<td>693.25 (F5)</td>
<td>156.25 (D#3)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>181.89 (F#3)</td>
<td>638.22 (D#5)</td>
<td>550.92 (C#5)</td>
<td>626.68 (D#5)</td>
<td>152.87 (D#3)</td>
</tr>
</tbody>
</table>

Table 5. The calculation of the frequency / Hz (Pitch) of BC
Figure 7: The highest Hz (pitch) of the ascending glissando in the first, the second and the third / last assessment of BC.

Figure 8: The highest Hz (pitch) of the descending glissando in the first, the second and the third / last assessment of BC.
larger than the ascending glissando from the first assessment.

In summary:
All descending glissandi end lower than where BC started the ascending glissando, and the difference between where BC started the ascending glissando and ended the descending glissando increases over time. The descending glissando from the first to the last assessment grows larger than the ascending glissando.

Conclusion and interpretation of the process:
BC performs the widest ascending and descending glissando in the second assessment. The ascending glissando in the last assessment is the smallest of the three assessments, but the descending glissando is both larger than the ascending glissando from the first and last assessment and the last. In all the descending glissandi BC reaches a lower pitch than where BC starts the ascending glissando.
Therefore the process can be described as improving from the first to the second assessment. The process from the second to the last assessment can be described as slightly deteriorating, but because the descending glissando both in the second and last assessment is wider than in the first assessment, and because BC in all three assessments benefits from the descending glissando the conclusion is that BC holds onto the improvement she achieved in the second assessment.

2. Analysis of Parameter 2: Comparing the highest pitch reached in the ascending glissando with the highest pitch reached when starting the descending glissando

The ascending glissando
As pictured in figure 7 BC reaches a frequency determined as E5 as the highest pitch in the ascending glissando in the first assessment.
In the second assessment BC reaches a frequency determined as G#5, which is four semitones higher than in the first assessment (see figure 7).
In the last assessment BC reaches a frequency determined as D#5, which is five semitones lower than in the second assessment, and one semitone lower than in the first assessment (see figure 7).

The descending glissando
As pictured in figure 8 BC reaches a frequency determined as C#5 in the descending glissando in the first assessment (see figure 8). In the second assessment BC reaches a frequency determined as F5, which is four semitones higher than in the first assessment (see figure 8).
In the last assessment BC reaches a frequency determined as D#5, which is two semitones lower than in the second assessment, but two semitones higher than in the first assessment (see figure 8).

Comparing the highest pitch from the ascending and descending glissando.
In the first assessment the highest pitch in the descending glissando is three semitones lower than the ascending glissando.
In the second assessment the highest pitch in the descending glissando is three semitones lower than the ascending glissando.
In the last assessment there is no difference between the ascending and the descending glissando.

Conclusion and interpretation of the process:
BC performs the highest pitch in the second assessment in both the ascending and descending glissando.
In the last assessment the highest ascending pitch is one semitone lower than in the first assessment, but the highest descending pitch in the last assessment is two semitones higher than in the first assessment, and reaches the same pitch as the highest pitch in the ascending glissando.
Therefore the process can be described as improving from the first to the second assessment. The process from the second to the last assessment can be described as slightly deteriorating, but because of the process of BC’s highest pitch in the descending glissando the conclusion is that BC holds onto the improvement she achieved in the second assessment.
3. Analysis of Parameter 3: The ending pitch related to the highest reached pitch in the ascending glissando

**The Ending Pitch (EP) in the ascending glissando:**
In the first assessment BC ends the ascending glissando at a frequency determined as F#4 (see figure 9). In the second assessment BC ends the ascending glissando at a frequency determined as F#5, which is 12 semitones higher than in the first assessment (see figure 9). In the last assessment BC ends the ascending glissando at a frequency determined as C#5, which is five semitones lower than in the second assessment, but still seven semitones higher than in the first assessment (see figure 9).

**Relating the Ending Pitch (EP) with the Highest Pitch (HP) in the ascending glissando:** In the first assessment BC reaches E5 as the highest pitch, but then has difficulties in letting go, ending the ascending glissando at F#4, which is 10 semitones lower in pitch. The duration of letting go of the ending pitch is 2.46 seconds, which is almost half the time BC uses to reach the highest pitch in the ascending glissando.

In the second assessment BC reaches G#5 and lets go of the ascending glissando at F#5, which is two semitones lower in pitch.

In the last assessment BC reaches D#5 and lets go of the ascending glissando at C#5, which is two semitones lower in pitch.

**Conclusion and interpretation of the process:** BC ending pitch is highest in the second assessment. The ending pitch in the last assessment is lower than in the second assessment, but still higher than in the first assessment. It is both visible, measurable, and audible that BC has difficulties in letting go of the ending pitch, and the duration of letting go is quite long. In both the second and last assessment the ending pitch is two semitones lower than the highest pitch reached in the ascending glissando, and shows an improvement of
letting go and a pattern for how BC lets go of the ending pitch later in the therapy. Because BC improves in letting go of the ending pitch, the last assessment ends seven semitones higher than the ending pitch in the first assessment. As mentioned in the introduction BC is vocally experienced and BCows the exercise very well. Furthermore is the pattern of having difficulties in letting go repeated during the whole first session. Thus it can be concluded that it is no mistake and not because the client does not understand the exercise that BC has difficulties in letting go of the ending pitch.

Relating this observation to chapter 4 “Clinical Approach as a Research Method”, this suggests that the duration of ending the ascending glissando reveals the “shadow” of the voice (see chapter 4.6.4). Because the duration of ending the ascending glissando after having reached the highest pitch is as long as it is, a more detailed analysis of this period and the sound quality can be made and give more information about the client. The process can be described as improving from the first to the second assessment, and the process from the second to the last assessment can be described as slightly deteriorating because the highest pitch reached decreases by five semitones. Because BC improves in letting go at the highest pitch reached in the second assessment and holds on to this improvement in the last assessment the process from the second to the last assessment can be described as improving. Additionally, the ending pitch in the last assessment still is higher than in the first assessment, and therefore it can be concluded that BC holds on to the improvement she achieved in the second assessment. This process pattern is also visible in the analysis of the first parameter and second parameter.

4. Analysis of Parameter 4: Time based analysis of sung glissando

The ascending glissando:
The ascending glissando decreases by 2.55 seconds from the first to the second assessment, decreasing further 1.08 seconds from the second to the last assessment (see table 4). The ascending glissando from the first assessment is the longest of the three ascending glissandi, and also longer than all the descending glissandi.

The descending glissando:
The descending glissando increases by 0.63 second from the first to the second assessment and decreases with 0.35 second from the second to the last assessment, but still 0.28 second longer than in the first assessment (see table 4). The descending glissando from the first assessment is shorter than the ascending glissando, and the second and last assessment is longer than the ascending glissando.

The duration of the ascending and descending glissando in total:
The glissando in the first assessment is in total the longest of the three assessments. In the second assessment the glissando in total decreases with 1.47 seconds, and decreases even further by 1.43 seconds from the second to the last assessment (see table 4).

The duration of breathing between the ascending and descending glissando:
The duration of breathing in connection with the sounding of the glissando decreases by 2.17 seconds from the first to the second assessment, and increases by 1.41 seconds in the last assessment, but still 0.76 second shorter than in the first assessment (see table 4).

<table>
<thead>
<tr>
<th>BC</th>
<th>Ascending/Sec.</th>
<th>Descending/Sec.</th>
<th>Total/Sec.</th>
<th>Breathing/Sec.</th>
</tr>
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<td>2. Assessment</td>
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<td>6,10</td>
<td>10,58</td>
<td>0,80</td>
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<td>3. Assessment</td>
<td>3,40</td>
<td>5,75</td>
<td>9,15</td>
<td>2,21</td>
</tr>
</tbody>
</table>

Table 6: BC - Time based analysis of sung glissando
Conclusion and interpretation of the process:
The duration of the ascending glissando decreases from the first to the last assessment. The duration of the descending glissando in the second and last assessment is longer than the descending glissando from the first assessment.

The duration of the ascending and descending glissando in total decreases over time. Relating the duration of breathing between the ascending and descending glissando the best controlled and fluently produced glissando is the one in the second assessment. In the second assessment the duration of breathing is so short (0,80 seconds) that it tells something about BC being able to do the natural reflex, filling up the lungs with air quickly, which supports the hypothesis, that BC is more relaxed in the body in the second assessment.

The duration of breathing is shortest in the second assessment, and though it increases from the second to the last assessment it still is shorter than in the first assessment. The process can be described as improving from the first to the second assessment, because it holds the longest descending glissando, probably also the longest glissando in total if BC did not have difficulties in letting go, and also having access to the natural reflex of filling up her lungs with air. The process from the second to the last assessment can be described as slightly deteriorating, because the duration of the descending glissando decreases a little but still longer than in the first assessment. The glissando in total decreases, and the duration of the breathing between the ascending and descending glissando slightly decreases, but still shorter than in the first assessment. It can therefore be concluded that BC holds onto the improvement she achieved in the second assessment.

Summary and interpretation of the process as a whole:
Table 7 gives an overview of the conclusion and interpretation of the process according to the four parameters of the glissando.

Within the analysis of parameters one, two, three and four the process can be described as improving from the first to the second assessment, and then slightly deteriorating from the second to the last assessment, but still compared to the first assessment the process can be described as improving, and concluding that BC is able to hold on to the achieved improvement.

In all the descending glissandi BC reaches a lower pitch than where BC starts the ascending glissando. This indicates that BC gives in to the benefit of the exercise and lets go of tension, ending being more relaxed and grounded at the end.

Keeping in mind that BC is an experienced vocalist, and the fact that she knows the exercises very well from her own training it seems she easily finds her way back in this working method.

AB is as just mentioned an experienced vocalist and knows the glissando movements very well because of her own vocal training. This may lead to the assumption that it should be an easy task for AB to do the glissandi exactly the way they are instructed, and that she would have easy access to the natural reflex of filling up the lungs with air though she is suffering from depression. However by studying the process from the

<table>
<thead>
<tr>
<th>BC</th>
<th>1. Pitch range</th>
<th>2. Max. asc. vs Max. des.</th>
<th>3. Ending pitch vs Max. asc.</th>
<th>4. Time based analysis</th>
</tr>
</thead>
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<tr>
<td>1. Assessment</td>
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<tr>
<td>2. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>3. Assessment</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 7: BC - Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
second to the last assessment it is both audible and measurable how easily the pitch range, the duration of breathing between the ascending and descending glissando, and the natural reflex of breathing in and filling up the lungs with air are affected by her state of being. In that way AB’s case highlights the question about improvement being explained as vocal training occurring over time. Relating the conclusion of the process with the music therapy process described in the introduction of AB the processes follow the same patterns. AB was in the last assessment tired after attending an intensive course, but very happy about being able to take part and complete the course. The small deterioration from the second to the last assessment could be an expression of the fatigue AB is feeling after having attended a working course over a week full time. Further it clarifies her resources at that present moment, as being able to hold on to the improvement she has achieved.

In a way the therapy process seems to continue positively from the second to the last assessment, in that AB improves in expressing feelings and inner experiences in words.
Figure 10: A picture presenting the computation of DC’s performance of the glissando movement in the 1., 2. and 3.
assessment including artifacts, as well as presenting the breathing and sounding duration for the tree assessments.
8.3.3 DC Analysis of Glissando

1. Analysis of Parameter 1: Calculating the pitch/phonational range

*The Ascending glissando*
In the first assessment DC’s ascending glissando starts at D#2 and reaches D5, a pitch range of 36 semitones (see Table 8). In the second assessment DC’s ascending glissando starts at C2, three semitones lower than in the first assessment, and reaches A#4, five semitones lower than in the first assessment, resulting in a pitch range of 34 semitones (see Table 8). In the last assessment DC’s ascending glissando starts at D2, two semitones higher than in the second assessment, and reaches C5, three semitones higher than in the second assessment, which results in having a pitch range of 35 tones (see Table 8).

*In summary:* DC decreases the ascending glissando by two semitones from the first to the second assessment, but then increases the ascending glissando by one semitone from the second to the last assessment. DC performs the largest ascending glissando in the first assessment.

*The Descending glissando*
In the first assessment DC’s descending glissando starts at A4 and reaches D2, resulting in a pitch range of 32 semitones (see Table 8). In the second assessment DC’s descending glissando starts at G4, two semitones lower than in the first assessment, and ends at B1, three semitones lower than in the first assessment, resulting in a pitch range of 33 semitones (see Table 8). In the last assessment DC’s descending glissando starts at F4, two semitones lower than in the second assessment, and ends at C2, one semitone higher than in the second assessment, resulting in a pitch range of 30 semitones (see Table 8).

*In summary:* DC’s descending glissando decreases two semitones from the first to the second assessment, and then decreases further four semitones from the second to the last assessment. DC performs the largest descending glissando in the second assessment. The last assessment is two semitones smaller than the first glissando, and therefore the smallest descending glissando of the three assessments.

Comparing the pitch range of the ascending and descending glissando
In the first assessment the descending glissando is four semitones smaller than the ascending glissando, and DC ends one semitone lower than where he started the ascending glissando. In the second assessment the descending glissando is one semitone smaller than the ascending glissando, and DC also this time ends the descending glissando one semitone lower than where he started the ascending glissando. In the last assessment the descending glissando is five semitones smaller than the ascending glissando, and DC ends the descending glissando two semitones lower than he started the ascending glissando.

<table>
<thead>
<tr>
<th>DC</th>
<th>Minimum pitch/Hz</th>
<th>Maximum pitch/Hz</th>
<th>Ending pitch/Hz</th>
<th>Maximum pitch/Hz</th>
<th>Minimum pitch/Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>76.31 (D#2)</td>
<td>573.51 (D5)</td>
<td>563.81 (C#5)</td>
<td>449.09 (A4)</td>
<td>75.12 (D2)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>66.68 (C2)</td>
<td>460.60 (A#4)</td>
<td>460.60 (A#4)</td>
<td>394.36 (G4)</td>
<td>60.43 (B1)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>71.59 (D2)</td>
<td>510.56 (C5)</td>
<td>510.56 (C5)</td>
<td>350.50 (F4)</td>
<td>64.58 (C2)</td>
</tr>
</tbody>
</table>

Table 8. The calculation of the frequency / Hz (Pitch) of DC.
Figure 11: The highest Hz (pitch) of the ascending glissando in the first, the second and the third / last assessment of DC.

Figure 12: The highest Hz (pitch) of the descending glissando in the first, the second and the third / last assessment of DC.
Conclusion and interpretation of the process
DC performs the widest ascending glissando in the first assessment, and the most narrow in the second assessment. The widest descending glissando is performed in the second assessment, and the most narrow in the last assessment. Therefore the process can be described as improving from the first to the second assessment, but then deteriorating from the second to the last assessment.

With only one semitone in difference between the ascending and descending glissando in the second assessment, this is evaluated to be the most balanced one of the three assessments. However the largest difference between the ascending and descending glissando is in the last assessment. Therefore the process can be described as improving from the first to the second assessment, and then deteriorating from the second to the last assessment.

In all the descending glissandi DC reaches a lower pitch than where DC starts the ascending glissando. This tells something about how well DC gives in to the benefit of the exercise and lets go of tension, ending being more relaxed and grounded at the end. The process is mixed. The conclusion is based on upper measurements that there generally is an improvement from the first to the second assessment, and then there is a deterioration from the second to the last assessment, and most often the result here is worse than in the first assessment.

2. Analysis of Parameter 2: Comparing the highest pitch reached in the ascending glissando with the highest pitch reached when starting the descending glissando

The ascending glissando
As pictured in figure 11 DC reaches a frequency determined as D5 as the highest pitch in the ascending glissando in the first assessment.

In the second assessment DC reaches a frequency determined as A#4, which is four semitones lower than in the first assessment (see figure 11).

In the last assessment DC reaches a frequency determined as C5, which is two semitones higher than in the second assessment, and two semitones lower than in the first assessment (see figure 11).

The descending glissando
As pictured in figure 12 DC reaches a frequency determined as A4 in the descending glissando in the first assessment (see figure 12).

In the second assessment DC reaches a frequency determined as G4, which is two semitones lower than in the first assessment (see figure 12).

In the last assessment DC reaches a frequency determined as F4, which is two semitones lower than in the second assessment, and four semitones lower than in the first assessment (see figure 12).

Comparing the highest pitch from the ascending and descending glissando.
In the first assessment the descending pitch is five semitones lower than the ascending glissando.

In the second assessment the descending pitch is two semitones lower than the ascending glissando.

In the last assessment the descending pitch is seven semitones lower than the ascending glissando.

Conclusion and interpretation of the process:
The difference between the ascending and descending glissando is smallest in the second assessment, and therefore the process can be described as improving from the first to the second assessment.

From the second to the last assessment the difference between the ascending glissando and the descending glissando increase and is the largest.

DC reaches the highest pitch in the first assessment in both the ascending and descending glissando. The lowest pitch is reached in the second assessment for the ascending glissando, and the pitch gets higher again in the last assessment, but still lower than in the first assessment. The highest pitch in the descending glissando decreases steadily from the first to the last assessment.

Therefore the process from the second to the last assessment can be described as deteriorating.
3. Analysis of Parameter 3: The ending pitch related to the highest reached pitch in the ascending glissando

*The ending pitch in the ascending glissando:*
In the first assessment DC ends the ascending glissando at a frequency determined as C#5 (see figure 13). In the second assessment DC ends the ascending glissando at a frequency determined as A#4, which is three semitones lower than in the first assessment (see figure 13). In the last assessment DC reaches C5 and lets go of the ending pitch at C5, making no difference between the highest and the ending pitch in the ascending glissando.

*Conclusion and interpretation of the process:*
In the second assessment the ending pitch is three semitones lower than the highest pitch reached in the ascending glissando in the first assessment.

*Relating the ending pitch with the highest pitch in the ascending glissando:*
In the first assessment DC reaches D5 as the highest pitch, and lets go of the ending pitch at C#5, which is one semitone lower in pitch. In the second assessment DC reaches A#4 and lets go of the ending pitch at A#4, making no difference between the highest and the ending pitch in the ascending glissando.

In the last assessment DC reaches C5 and lets go of the ending pitch at C5, making no difference between the highest and the ending pitch in the ascending glissando.

![Figure 13: The ending Hz (pitch) of the ascending glissando in the first, the second and the third / last assessment of DC.](image)
assessment, but in the second assessment it gets a bit higher again, but still lower than in the first assessment.

DC exhibits no difficulties in letting go of the ending pitch, which is good. In both the second and last assessment DC is letting go of the ending pitch at the same pitch as the highest pitch reached in the ascending glissando, and a pattern is held. Therefore the process can be described as improving from the first to the last assessment.

4. Analysis of Parameter 4: Time based analysis of sung glissando

The ascending glissando:
The ascending glissando decreases by 0.16 second from the first to the second assessment and decreases even further 0.23 second from the second to the last assessment (see table 9).

The descending glissando:
The descending glissando increases by 0.19 second from the first to the second assessment, but decreasing by 1.32 seconds from the second to the last assessment (see table 9).

The duration of the ascending and descending glissando in total:
The glissando increases in total by 0.03 second from the first to the second assessment, and the longest glissando in total of the three assessments. From the second to the last assessment the glissando in total decreases by 1.55 seconds and it is even 1.52 seconds shorter than in the first assessment. As such, the last assessment is the shortest of the three assessments (see table 9).

The duration of breathing between the ascending and descending glissando:
The duration of breathing between the ascending and descending glissando decreases by 0.43 second from the first to the second assessment, then increases by 1.09 seconds from the second to the last assessment, even 0.66 second longer than in the first assessment. The breathing duration from the second assessment is the shortest of the three assessments (see table 9).

Conclusion and interpretation of the process:
The ascending glissando decreases steadily over time. The descending glissando first increases, but then decreases from the second to the last assessment, and ends being even shorter than in the first assessment. The glissando in total hardly increases from the first to the second assessment, and then decreases from the second to the last assessment, ending being even shorter than in the first assessment. The duration of breath between the ascending and descending glissando decreases from the first to the second, but then increases from the second to the last assessment, and even ends being longer than in the first assessment. Therefore the process can be described as improving slightly from the first to the second assessment, but then deteriorating from the second to the last assessment, and ending worse than at the beginning.

<table>
<thead>
<tr>
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<th>Ascending / Sec.</th>
<th>Descending / Sec.</th>
<th>Total / Sec.</th>
<th>Breathing / Sec.</th>
</tr>
</thead>
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<td>3.93</td>
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<td>7.66</td>
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<tr>
<td>3. Ass.</td>
<td>3.31</td>
<td>2.80</td>
<td>6.11</td>
<td>2.52</td>
</tr>
</tbody>
</table>

Table 9: DC - Time based analysis of sung glissando
Summary and interpretation of the process as a whole:

Table 10 is an overview of the conclusion and interpretation of the process according to the four parameters of the glissando. DC’s process can be described as improving from the first to the second assessment, but then in three out of four parameters the process can be described as deteriorating. In the last parameter (the ending pitch related to the highest reached pitch in the ascending glissando) the process can be described as improving further from the second to the last assessment.

It is clear that DC benefits from the descending glissando, and lets go of tension, ending being more relaxed and grounded at the end. But in parameter one, two and four the process can be described as improving from the first to the second assessment, but then deteriorating from the second to the last assessment. Most often the results here are worse than in the first assessment. This leads me to clinically consider that something is happening between the second and the last assessment, and the situation needs a closer look.

Relating this analysis to the introduction of DC, he in the second assessment experiences the depression at its worst, and is impatient about his state of being because it lasted very long (around nine months). Therefore DC is offered more anti-depressive medicine. In the last assessment he is feeling better, but the results of the measurements do not show this. They show he is worse than in the first assessment. A week after the last assessment DC ends in mania. By studying the overall clinical description in more detail DC is finally diagnosed as suffering from a bipolar disorder and not a unipolar depression.
8.3.4 BD Analysis of Glissando

Figure 14: A picture presenting the computation of BD’s performance of the glissando movement in the 1., 2. and 3. assessment including artifacts, as well as presenting the breathing and sounding duration for the three assessments.
Chapter 8

1. Analysis of Parameter 1: Calculating the pitch/phonational range

The Ascending glissando
In the first assessment BD’s ascending glissando starts at F2 and reaches A4, a pitch range of 29 semitones (see Table 11).
In the second assessment BD’s ascending glissando starts at G2, two semitones higher than in the first assessment, and reaches C5, three semitones higher than in the first assessment, resulting in a pitch range of 30 semitones (see Table 11).
In the last assessment BD’s ascending glissando starts at G#2, five semitones higher than in the second assessment, and reaches F5, five semitones higher than in the second assessment, which results in having a pitch range of 34 tones (see Table 11).

In summary:
BD increases the ascending glissando by six semitones from the first to the second assessment, but then decreases the ascending glissando by one semitone from the second to the last assessment.
BD performs the widest ascending glissando in the second assessment.
The last assessment is however still five semitones wider than in the first assessment.

The Descending glissando
In the first assessment BD’s descending glissando starts at E4 and reaches D2, a pitch range of 27 semitones (see Table 11).
In the second assessment BD’s descending glissando starts at D#4, one semitone lower than in the first assessment and ends at A1, five semitones lower than in the first assessment, resulting in a pitch range of 31 tones (see Table 11).
In the last assessment BD’s descending glissando starts at F4, two semitones higher than in the second assessment, and ends at E2, seven semitones higher than in the second assessment, resulting in a pitch range of 26 semitones (see Table 11).

In summary:
BD increases the descending glissando by four semitones from the first to the second assessment, and then decreases the descending glissando by five semitones from the second to the last assessment.
BD performs the widest descending glissando in the second assessment, and performs the smallest descending glissando in the last assessment.

Comparing the pitch range of the ascending and descending glissando:
In the first assessment the descending glissando is two semitones smaller than the ascending glissando, but ending the descending glissando three semitones lower than BD started the ascending glissando.
In the second assessment the descending glissando is four semitones smaller than the descending glissando, but ending the descending glissando five semitones lower than BD started the ascending glissando.
In the last assessment the descending glissando is eight semitones smaller than the ascending glissando, but ending the descending glissando four semitones lower than BD started the ascending glissando.

Conclusion and interpretation of the process:
BD all in all performs the widest ascending and descending glissando in the second assessment, and though the descending glissando in the last assessment is smaller than in the first assessment, the ascending glissando from the last assessment still is larger than the first assessment. The process can therefore be described as improving from the first to the second assessment, and then slightly deteriorating from the second to the

<table>
<thead>
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<th>BD</th>
<th>Minimum pitch/Hz</th>
<th>Maximum pitch/Hz</th>
<th>Ending pitch/Hz</th>
<th>Maximum pitch/Hz</th>
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<tr>
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<td>313.69 (D#4)</td>
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</tr>
<tr>
<td>3. Assessment</td>
<td>103.13 (G#2)</td>
<td>680.16 (F5)</td>
<td>479.59 (A#4)</td>
<td>346.81 (F4)</td>
<td>80.92 (E2)</td>
</tr>
</tbody>
</table>

Table 11. The calculation of the frequency / Hz (Pitch) of BD.
In all the descending glissandi BD reaches a lower pitch than where BD starts the ascending glissando. This tells something about how well BD is giving in to the benefit of the exercise and letting go of tension, ending being more relaxed and grounded at the end.

2 Analysis of Parameter 2: Comparing the highest pitch reached in the ascending glissando with the highest pitch reached when starting the descending glissando

**The ascending glissando**
As pictured in figure 15 BD reaches a frequency determined as A4 as the highest pitch in the ascending glissando in the first assessment.
In the second assessment BD reaches a frequency determined as C5, which is three semitones higher than in the first assessment (see figure 15).
In the last assessment BD reaches a frequency determined as F5, which is five semitones higher than in the second assessment (see figure 15).

**The descending glissando**
As pictured in figure 16 BD reaches a frequency determined as E4 in the descending glissando in the first assessment (see figure 16).
In the second assessment BD reaches a frequency determined as D#4, which is one semitone lower than in the first assessment (see figure 16).
In the last assessment BD reaches a frequency determined as F4, which is two semitones higher than in the second and one tone higher than in the first assessment (see figure 16).

Comparing the highest pitch from the ascending and descending glissando.
In the first assessment the descending pitch is 5 semitones lower than in the ascending glissando.
In the second assessment the descending pitch is 9 semitones lower than in the ascending glissando.

![Figure 15: The highest Hz (pitch) of the ascending glissando in the first, the second and the third / last assessment of BD.](image-url)
In the last assessment the descending pitch is 12 semitones lower than in the ascending glissando.

**Conclusion and interpretation of the process:**
BD reaches the highest pitch in the ascending and descending glissando in the last assessment. The highest pitch from the descending glissando deteriorates from the first to the second assessment, but then improves from the second to the last assessment, and reaches a pitch, which is both higher than the descending pitch in the first and second assessment. Therefore the conclusion is that the process can be described as steadily improving over time in both the ascending and descending glissando. The difference between the ascending and descending glissando however increases over time, and this questions the improving process.

3 Analysis of Parameter 3: The ending pitch related to the highest reached pitch in the ascending glissando

*The ending pitch in the ascending glissando:* In the first assessment BD ends the ascending glissando at a frequency determined as G#4 (see figure 17). In the second assessment BD ends the ascending glissando at a frequency determined as C5, which is four semitones higher than in the first assessment (see figure 17). In the last assessment BD ends the ascending glissando at a frequency determined as A#4, which is two semitones lower than in the second assessment, but still two semitones higher than in the first assessment (see figure 17).
Relating the ending pitch with the highest pitch in the ascending glissando:

In the first assessment BD reaches A4 as the highest pitch, and lets go of the ascending glissando at G#4, which is one semitone lower in pitch.

In the first assessment BD reaches C5 as the highest pitch, and lets go of the ascending glissando at C5, making no difference between the highest and the ending pitch in the ascending glissando.

In the last assessment BD reaches F5 and lets go of the ascending glissando at A#4, which is seven semitones lower in pitch and indicates that BD has difficulties in letting go at the highest pitch.

Conclusion and interpretation of the process:

In the first and second assessment there hardly is any difference between the ending pitch and the highest reached pitch in the ascending glissando. However, it is visible that BD experiences a little difficulty in letting go of the ascending glissando in the last assessment. It is very difficult to hear, when listening to the sound-file, that BD is having difficulties in letting go, and therefore it is very difficult to collect more information from analysing the period of the ending pitch (see analysis of BC chapter 8.3.2).

Therefore the process can be described as improving from the first to the second assessment, and then slightly deteriorating from the second to the last assessment. However, BD holds on to the improvement he achieved in the second assessment.
4 Analysis of Parameter 4: Time based analysis of sung glissando

**The ascending glissando:**
The ascending glissando increases by 0.19 second from the first to the second assessment, and decreases by 0.71 second from the second to the last assessment. The last ascending glissando is 0.52 second shorter than the ascending glissando from the first assessment, and therefore the shortest of the three assessments (see table 12).

**The descending glissando:**
The descending glissando increases by 0.49 second from the first to the second assessment, and decreases by 0.12 second from the second to the last assessment, but still 0.37 second longer than the descending glissando in the first assessment (see table 12).

**The duration of the ascending and descending glissando in total:**
The glissando in total increases by 1.30 seconds from the first to the second assessment, and decreases by 0.83 second from the second to the last assessment. The glissando from the last assessment is 0.13 second shorter than in the first assessment and therefore the shortest of the three assessments (see table 12).

**The duration of breathing between the ascending and descending glissando:**
The breathing increases with 1.45 seconds from the first assessment to the second assessment, and decreases with 0.09 second from the second to the last assessment (see table 12).

**Conclusion and interpretation of the process:**
The ascending glissando first increases and then decreases, and ends being shorter than in the first assessment.
The descending glissando first increases, and then decreases slightly, but is still longer than in the first assessment.
The glissando in total increases, but then decreases and ends being shorter than in the first assessment.
The duration of breathing between the ascending and descending glissando first increases and then decreases again. Therefore the process can be described as improving from the first to the second assessment, and then slightly deteriorating from the second to the last assessment, but BD holds onto the improvement he achieved in the second assessment.

**Summary and interpretation of the process as a whole:**
Table 13 gives an overview of the conclusion and interpretation of the process according to the four parameters of the glissando.

BD’s process can be described as improving in all parameters from the first to the second assessment.

<table>
<thead>
<tr>
<th>BD</th>
<th>1. Pitch range</th>
<th>2. Max. asc. vs Max. des.</th>
<th>3. Ending pitch vs. Max asc.</th>
<th>4. Time based analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 13: BD Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
From the second to the last assessment the process can be described as improving in two parameters and deteriorating in two parameters. Comparing the first assessment with the last assessment the process can be described as improving in all parameters.

It is clear that BD is benefitting from the descending glissando, and letting go of tension, ending being more relaxed and grounded at the end.

In the analysis of parameter one, three and four the process can be described as improving from the first to the second assessment, and then slightly deteriorating from the second to the last assessment, but BD holds onto the improvement he achieved in the second assessment.

In the analysis of parameter two BD steadily improves in reaching a higher pitch over time, but the difference between the ascending and descending glissando increases, which put this conclusion in doubt.

The introduction of BD describes that BD first was diagnosed depressed, and when the depression becomes mild, another diagnosis, autism, is revealed. This occurs between the second and the last assessment.

Furthermore BD is informed that the music therapy is stopping after the last assessment, so this session then also marks a change in “way of life”. Relating this information to the process in the analysis it can very well be that BD has difficulties in letting go of the contact to the music therapy.

My clinical experience is that it is quite common to be a bit concerned about a depression coming back, when the music therapy is stopped. In this case BD might as well be concerned with the anxiety, which he experienced in connection to the depression.

It is visible that BD has a little difficulty in letting go of the ascending glissando in the last assessment, but it is very difficult to hear, when listening to the sound file. This shows that some changes are measurable, but not audible.
8.4 The analysis of the CoreTone and CoreToneVolume

As mentioned in chapter 7.1.3.1 the analysis of the CoreTone and CoreToneVolume is undertaken by analysing six parameters:

- fundamental frequency / Hz (Pitch)
- spectrum
- spectrum centroid
- formant contours
- intensity - loudness
- duration.

The measurements and calculations are carried out in PRAAT and in the MIR toolbox. A manual and a protocol for approaching the chosen vocal parameters with a psychoacoustical analysis is developed and described in detail. This manual is to be found as appendix for chapter 8, USB-memorystick).

In the following I will shortly present a few guidelines for each parameter and how they are related to my clinical experience and theoretical knowledge as well as an introduction to how the analysis is presented. This is followed by an analysis of the CoreTone, starting with AB, BC, DC and BD.

1. Analysis of Parameter 1: Measuring the fundamental frequency / Hz (Pitch) of the CoreTone

It is my clinical experience as well as theoretical knowledge that the pitch is very often affected by the state of being, in the sense that depression often influences the pitch to be lower. When suffering from anxiety the pitch gets higher (see chapter 2.3.1.). Sometimes the production and sustaining of the CoreTone is even constantly varied and unstable due to the state of being.

For measuring the fundamental frequency of the CoreTone and CoreToneVolume I have used PRAAT.

The following two parameters
The MIRtoolbox version 1.1 (Lartillot & Toiviainen, 2007) is used for analysing the following two parameters: spectrum and spectrum centroid. The calculations and measurements have been done by Prof. Toumas Eerola, Centre of Excellence, Department of Music, University of Jyväskylä, Finland, by using the MIRtoolbox. Eerola also supported me with the literature and knowledge of what defines the different parameters.

Because I have not compiled the measurements and calculations myself, the different methods will not be described in detail. After Eerola compiled the calculations and measurements I made the analysis and interpretation.

2. Analysis of Parameter 2: A Spectrum computation of the CoreTone

This analysis has to do with a spectrum computation of the CoreTone. The spectrum is as described earlier (see chapter 4.6) the fundamental tone and other tones called overtones. Overtones are frequencies higher than the fundamental frequency of a sound (Sundberg 1987).

It is my clinical experience as well as theoretical knowledge that the richness and intensity of the overtones are highly affected by the state of being. As Sundberg points out in chapter 2.3.1 the muscle activity typically will be minimised in sadness and depression, because then people are not really in a condition to express themselves by means of wild gestures, and therefore movements will be minimised. This affects the sound of the voice in that way that overtones are bereft (Sundberg 1987). Therefore the aim of the psychodynamic voice therapy is to enhance the sound richness. If a person is depressed the spectrum of overtones is limited and very low in intensity (see chapter 4.6.2.1).

According to Prof. Tuomas Eerola the spectral descriptors are filtered to contain only frequencies between 70 - 3000 Hz for women, and 40 - 1000 Hz for men. This is done to eliminate any low and high frequency
artifacts. The limits are set according to an initial look at the fundamental frequency and the first three formants in the materials. This is carried out separately for men and women, and the settings are kept identical between the analysis of men and women.

In order to clarify the shape of the spectral peaks, the figures displaying the spectra are produced by smoothing the spectral peaks with gaussian distribution (“gauss, 40” in the MIR toolbox).

A spectrum computation of the CoreTone will show the energy/magnitude of the raw sound pressure. The magnitude is affected by how close the participant is standing to the microphone, and the power of the participant’s voice. Therefore the participant is instructed to stand approximately at the same spot in each assessment, with approximately the same distance to the microphone, while doing the first four exercises, as described in the assessment protocol (see chapter 6.6.3). In this way the energy/magnitude of the participant’s CoreTone can be evaluated.

3. Analysis of Parameter 3: The Spectral Centroid of the CoreTone

This analysis has to do with a calculation of the spectral centroid of the CoreTone. Spectral centroid is an amplitude-weighted mean frequency of the spectrum energy, and is reported as a major determinant of timbre (e.g., Grey 1977, Krumhans 1989, McAdams et al. 1995, Samson et al. 1997, Lakatos 2000, Marozeau et al. 2003). Low spectral centroid indicates dark timbre and high centroid is often interpreted as bright timbre.

In chapter 4.9.2.1 a listening attitude towards a horizontal body sensation and the quality of the sound is presented. When listening to the horizontal body sensation a sound placed in the front of the body may be experienced more bright. If the sound is withdrawn and placed in the back of the body the sound may be described as more dark. This is related to Russell’s circumplex which to some degree may guide the psychological interpretation of the emotions projected. A projected happy sound is related to a bright quality, and a projected depressive or sad sound is related to a dark quality.

4. Analysis of Parameter 4: The Formant contours of the CoreTone

This analysis is concerned with a computation of the formant contours of the CoreTone. A formant object represents spectral structure as a function of time: a formant contour. The analysis is concerned with the number of formants in the frame (usually between 2 - 5).

The human tract is able to produce a highly variable structure of overtones, called formant, which define different vowels. As mentioned in chapter 4.6 the quality of the voice source, vowel quality, and timbre are constituted by the variation in muscle contractions and air pressure which shape the vocal tract and determine the formant frequencies (Sundberg 1987).

Air volume possesses the properties of both mass and compliance, and is therefore a resonator. Air passing through the vocal tract does not weigh much, but it still weighs something and therefore possesses mass. Air is compressed, which then strives to resume its original volume and imply that it possesses compliance.

These are the reasons why air enclosed in the vocal tract acts as a resonator and possesses resonance at certain frequencies. The transmitted frequencies, which fit the resonator optimally, so to speak, are called the resonance frequencies or, if the resonator is the human vocal tract, formant frequencies (Sundberg 1987).

In studying the quality of the formant contours it will be visualized how rich and resonant the voice is, or if the person sounding has power enough to provide a sound where the formant contours will be drawn very clearly by the red speckles gathering and compressed into four or five contours. As described above the muscle activity is typically minimised when suffering from depression.

According to Sundberg (1989) the first four or five formants are the most important ones, where the two lowest formants are the ones that determine what kind of vowel is vocalised. Nevertheless, all the formants are of
great significance in determining the voice timbre.

A formant of a vocalisation is defined as the spectral peaks of the sound spectrum of the voice. Formant is used to mean an acoustic resonance. Formants are the distinguishing or meaningful frequency components of human speech and of singing. By definition, the information that humans require to distinguish between vowels can be represented purely quantitatively by the frequency content of the vowel sounds.

The formant with the lowest frequency is called $f_1$, the second $f_2$, and so on. Most often the two first formants, $f_1$ and $f_2$ are enough to disambiguate the vowel. Vowels will almost always have four or more distinguishable formants. Sometimes there are more than six.

In measuring the formants of the CoreTone I have used PRAAT. The analysis will contain formant contours drawn as red speckles.

5. Analysis of Parameter 5: The Intensity - loudness of the CoreTone and the CoreToneVolume

It is my clinical experience as well as theoretical knowledge that the intensity is very often affected by the state of being, in the sense that depression often influence the intensity to decrease in a way that the client’s voice almost vanishes (see chapter 2.3.1).

The analysis of the intensity, the loudness of the CoreTone, is measured in PRAAT. The standard setting is from 50 - 100 dB (decibel), where the focus is on the sound of the CoreTone. If I change the setting to go from 0 - 100 the background noise would have an influence on the measurements (Boersma & Weenink 2010).

I have chosen to measure the intensity with PRAAT in this exercise and the two following exercises, the CoreToneVolume and the Song, because the participant stands in approximately the same spot.

6. Analysis of Parameter 6: A time measurement (in seconds) of the Duration of the CoreTone and the CoreToneVolume

A person suffering from depression often struggles with breathing because all muscle activity minimised. It is my clinical experience that this decreases sounding duration and increases the breathing duration (see chapter 2.3.7 and 4.7.2.1). This analysis is concerned with measuring the length of time (in seconds) the participant takes when sounding the CoreTone and the CoreToneVolume. PRAAT is used for this analysis.

8.4.1 Introduction to the analysis

In the following there is an introduction to how the analysis will be presented. Then follows the analysis of first the women, AB and BC, and then the men, DC and BD. After the analysis of each parameter a conclusion and interpretation of the process are made.

One woman and one man\(^4\), who are not vocally experienced, and never have had singing lessons, or tried music therapy undertook one voice assessment following the same procedure as the participant offered music therapy in this study. To perceive and fully understand parts of the analysis undertaken of the second, fifth and seventh parameters, I have added calculations or computations made from their assessment into this introduction. They are not considered or used as a baseline, more as a reference to explain and clarify the vocal parameters analysed and how a non-clinical voice appears.

1. Analysis of Parameter 1: Measuring the fundamental frequency / Hz (Pitch) of the CoreTone

First the measurement of the fundamental frequency of the CoreTone in the first, second and last assessments will be presented in a table. The first column lists the name of the participant and the three assessments. The second column shows an accurate measurement of the fundamental frequency of the CoreTone in Hertz (Hz) as well as the scientific name of the pitch determined; the

\(^4\) Earlier referred to as “non-clinical”.

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note equivalent of the measured frequency value in the English/American standard. For this purpose I have used a table from “Acoustics and Psychoacoustics” (Howard & Angus 2006, pp 151). In each case the name has been chosen according to which note the fundamental frequency is closest to in frequency. All differences and movements in pitch will be calculated in semitones.

2. Analysis of Parameter 2: A Spectrum computation of the CoreTone
The analysis will show the spectrum computation of each CoreTone in the three assessment of the participants in a figure. The more pure the peaks are shown in the spectrum the more pure the voice is. This can be illustrated by studying the spectrums of the non-clinical man and woman (see figure 18 and 19). Theoretically it can be shown that the sound levels of the overtones in the spectrum can be expected to decrease by about 12 dB/octaves, making a linear frequency scale (Sundberg 1987), see chapter 4.5. But this curve will change according to the quality / timbre of the voice.

Studying the spectrum of the non-clinical woman her spectrum make a linear frequency scale, whereas this is not the case with the non-clinical man. Listening to the sound file of both the non-clinical man and non-clinical woman it is audible that the voice quality it different. Not only because of the gender, but because the non-clinical man also has a nasal quality to the vocal sound quality as a whole (listen to the CoreTone, appendix for chapter 8, USB-memorystick).

Bearing in mind that the aim of the therapy is to enrich the voice, making the components constituting the voice source spectrum more resonant, and powerful, the main focus of this analysis is upon the amount of overtones present, and the magnitude / “energy” of all the components constituting the voice source spectrum. The richer and more powerful the overtones of the CoreTone, the more resonant and alive the CoreTone is.

3. Analysis of Parameter 3: The Spectral Centroid of the CoreTone
First the calculation of the spectral centroid will be presented in a figure. The x-axis illustrates the measurement of the spectral centroid in the first, second and last assessment. The y-axis shows the calculation of the Spectral Centroid in hertz (Hz). The analysis of the spectral centroid will in the conclusion and interpretation of the process be connected to my subjective evaluation regarding the sound quality focusing on the two qualities dark and bright. This is done in order to see if the calculation of the spectral centroid will capture a part of the vocal timbre, which is relevant for clinical practice.

My way of listening for this is according to a body sensation of brightness (forward in the body) and darkness (backward in the body). When sounding in the middle of the body, there will be a sensation of both qualities being present: a spectrum of both darkness and brightness. My own experience of sounding these qualities of the timbre when the quality is moving from darkness towards brightness is like experiencing the sun coming into a dark room. In clinical practice I have experienced that the sensation of the CoreTone is supporting clients to rediscover the sensation of not only being suffering from sadness, but also to a certain extent being happy about something.

4. Analysis of Parameter 4: The Formant contours of the CoreTone
First an illustration will show the formant contours of the CoreTone in its full length. The formant contours appear as red speckles.
Figure 18: Spectrum computation of non-clinical woman sounding the CoreTone - 10.10 seconds.

Figure 19: Spectrum computation of non-clinical man sounding the CoreTone - 13.33 seconds.
Figure 20: Formant contours computation of non-clinical woman sounding the CoreTone - 10.10 seconds.

Figure 21: Formant contours computation of non-clinical man sounding the CoreTone - 13.33 seconds.
To support the experience of the sounding period, the pitch contour appears as an analogue grey line.

To the left of the y-axis the pitch range of the formant contours is shown in hertz (Hz) written in red, and to the right of the y-axis the pitch range of the pitch contour is shown in hertz (Hz) written in grey. The x-axis shows the time in seconds (s.). Below the illustration the name of the participant and the assessment will be written.

Then follows the analysis. Each analysis is closed with a conclusion and interpretation of the process. The analysis will as mentioned earlier consist of formant contours drawn as red speckles. The analysis of the formant contours in this study will focus on and describe how clear the formant contours appear.

If the voice is very resonant, pure and alive, the formant contours will be drawn very clearly by the red speckles gathering and compressed into four or five contours, as well as hardly any red speckles appearing between the contours. This can be illustrated by studying the formant contours of the Core-Tone of the non-clinical man and woman (see figure 20 and 21).

If the voice is very breathy, with less intensity, or uneven, the fewer formant contours present will be visible. The red speckles will then appear more and more apart and disconnected.

Studying the formant contours of the woman four formant contours are very clearly visible (see figure 20). There are no red speckles appearing between the formant contours. The red speckles in each formant contour (F1, F2, F3 and F4) appear compressed and gathered. At the end the structure of the formant contours changes indicating that the woman is closing her mouth and making a closing of the sounding of the CoreTone.

Studying the formant contours of the man four formant contours are very clearly visible (see figure 21). There are no red speckles appearing between the formant contours. The red speckles appear compressed and gathered in each single formant contour, and at the end the structure of the formant contour is clearly changing indicating that the sounding of the CoreTone is coming to an ending.

5. Analysis of Parameter 5: The Intensity - loudness of the CoreTone
The first column in the table lists the name of the participant and the three assessments. The second column shows an accurate measurement of the maximum intensity of the CoreTone in decibel (dB) in selected period of sounding the CoreTone.

6. Analysis of Parameter 6: A time measurement (in seconds) of the Duration of the CoreTone
The measured durations of the CoreTone and CoreToneVolume will be presented in a Table. The table gives the duration in seconds of the CoreTone in its full length. The first column lists the name of the participant and the three assessments. The second column shows the duration of the CoreTone.

First an analysis of the duration of the CoreTone is made, then follows a conclusion and interpretation.

To illustrate the duration of a non-clinical woman and non-clinical man the calculations of the CoreTone in its full length for the woman is 10.10 seconds and for the man 13.33 seconds.
8.4.2 AB: Analysis of the CoreTone

The first assessment lacks the analysis of some of the parameters, because I forgot to have AB sing once alone. However it has been possible to extract around 3 seconds from the very beginning of the second session, and this was enough to do the calculation and measurement done with the MIR toolbox and to measure the fundamental frequency. Parameters four, five and six (Formant, Intensity and Duration) are not possible to calculate, and therefore left empty.

1. Analysis of Parameter 1: Measuring the fundamental frequency / Hz (Pitch) of the CoreTone

AB’s frequency increases by 1.56 Hz from the first to the second assessment, and therefore not changing pitch (see table 14)

<table>
<thead>
<tr>
<th>AB</th>
<th>Fundamental frequency/Hz (Pitch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>161.39 (E3)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>162.95 (E3)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>190.35 (F#3)</td>
</tr>
</tbody>
</table>

Table 14. The fundamental frequency/Hz (Pitch) of AB’s CoreTone

Conclusion and interpretation of the process:
The fundamental frequency of the CoreTone increases slightly from the first to the second assessment, but do not change in pitch. Therefore the process hardly can be described as improving. The fundamental frequency increases further from the second to the last assessment, and getting higher in pitch. Therefore the process can be described as improving over time.

2. Analysis of Parameter 2: A Spectrum computation of the CoreTone

The energy/magnitude of AB’s fundamental frequency is around 125 in the first assessment. Seven overtones are present, however all with very low energy/magnitude. All except partial five are just below 50. Partial five is just above 50.

In the second assessment the energy/magnitude of AB’s fundamental frequency is increased to 500. Six overtones are present, and the energy/magnitude has increased. Partial two and four is above 300, partial three and six are just above 100, and partial five is close to 200. Partial seven is around 50.

In the last assessment the energy/magnitude of AB’s fundamental frequency decreases from 500 to around 300. Six overtones are present, and the energy/magnitude of all overtone has increased. Three partials are above 400 (Partial two, four and five). Partial three is just above 200, and partial six and seven are around 150.

Conclusion and interpretation of the process:
The energy/magnitude of all the overtones increases from the first to the second assessment, and again from the second to the last assessment. The energy/magnitude of the fundamental frequency increases from the first to the second, but then decreases from the second to the last assessment. However the energy/magnitude is still higher in the last assessment than in the first assessment. Therefore it can be concluded that the CoreTone becomes richer and more alive over time, and therefore the process can be described as improving over time.
Figure 22: Spectrum computation of AB sounding the CoreTone in the 1., 2. and 3. assessment.
3. Analysis of Parameter 3: The Spectral Centroid of the CoreTone
In the first assessment AB’s spectral centroid is calculated to be just above 700 Hz (see figure 23). In the second assessment the spectral centroid decreases from just above 700 Hz to below 700 Hz (see figure 23). In the last assessment the spectral centroid of the AB’s CoreTone increases from below 700 Hz to around 875 Hz (see figure 23).

Conclusion and interpretation of the process:
The spectral centroid of AB’s CoreTone decreases from the first to the second assessment and then increases from the second to the last assessment. Therefore the interpretation of the process is that the sound quality is darker in the first and second assessment than in the last assessment. It can therefore be concluded that the sound quality from the first to the last assessments is moving towards brightness.

Because I missed having AB singing alone it is not possible to listen and evaluate the sound quality in the first assessment in comparison with the second and last assessment. However my subjective evaluation of the sound quality in the second in comparison with the last assessment confirms that the sound quality of the CoreTone is moving towards brightness.

Listen to soundfile AB-1-Assessment-CoreTone - AB-3-Assessment-CoreTone (see appendix for chapter 8, AB-Sound files, USB-memorystick).

4. Analysis of Parameter 4: The Formant contours of the CoreTone
The first assessment is as mentioned earlier missing.
In the second assessment there are four formant contours visible. F1 is the most clear, gathered and compressed of the four, but still not making a clear red line. F2, F3 and F4 are gathered, but the red speckles appear less gathered, with more space between the red speckles (see figure 24).

In the last assessment there are four formant contours visible, and the formant contours increase very much in clarity (see figure 25). Taking a closer look at F1, F2 and F3 the red speckles are gathered and compressed, making a red line (see figure 25). In F4 the red speckles appear gathered, but not so compressed. There are all in all hardly any red speckles appearing between the contours (see figure 25).

Conclusion and interpretation of the process:
The formant contours increase very much in clarity from the second to the last assessment. Therefore the process can be described as improving from the second to the last assessment, and it can be concluded that the CoreTone is most pure, resonant and alive in the last assessment.

5. Analysis of Parameter 5: The Intensity - loudness of the CoreTone
AB’s intensity increases 9.40 dB from the second to the last assessment (see table 15).

Table 15. The intensity of AB sounding the CoreTone

<table>
<thead>
<tr>
<th></th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>-</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>71.26</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>80.66</td>
</tr>
</tbody>
</table>

Conclusion and interpretation of the process:
The CoreTone increases in intensity from the second to the last assessment. Therefore the process can be described as improving over time.
Figure 24: Formant contours computation of AB sounding the CoreTone in the 2. assessment.

Figure 25: Formant contours computation of AB sounding the CoreTone in the 3. assessment.
6. Analysis of Parameter 6: A time measurement (in seconds) of the Duration of the CoreTone
AB’s duration increases with 4.40 seconds from the second to the last assessment.

<table>
<thead>
<tr>
<th>AB</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>-</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>6.29</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>10.69</td>
</tr>
</tbody>
</table>

Table 16. The duration of AB sounding the CoreTone

Conclusion and interpretation of the process:
Because the CoreTone increases in duration from the second to the last assessment the process can be described as improving.

Summary and interpretation of the process as a whole:
Table 17 gives an overview of the conclusions and interpretations of the process according to the six parameters of the CoreTone.

From the first to the second assessment only three parameters out of six were possible to measure and analyse. The process can be described as improving in two out of three possible parameters, the first and the second parameter, from the first to the second assessment. In the third parameter the process can be described as deteriorating from the first to the second assessment. From the second to the last assessment the process can be described as improving in all parameters.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
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<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>-</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 17: The process of AB’s CoreTone over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
8.4.3 AB: Analysis of the CoreToneVolume

1. Analysis of Parameter 1: Measuring the pitch / fundamental frequency (f0) of the CoreToneVolume.

From the first to the second assessment AB's fundamental frequency decreases by 8.51 Hz and therefore going down by one semitone (see table 18).

From the second to the last assessment the fundamental frequency increases by 19.16 Hz and therefore going up two semitones (see table 18).

<table>
<thead>
<tr>
<th>AB</th>
<th>Hz/Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>180.04 (F#3)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>171.53 (F3)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>190.69 (G3)</td>
</tr>
</tbody>
</table>

Table 18. The fundamental frequency/Hz (Pitch) of AB's CoreToneVolume

Conclusion and interpretation of the process:
The fundamental frequency of the CoreTone decreases from the first to the second assessment, being one semitone lower than in the first assessment.

From the second to the last assessment the fundamental frequency of the CoreTone increases, being two semitones higher than in the second assessment, and one semitone higher than in the first assessment.

Therefore the process can be described as deteriorating from the first to the second assessment, but then improving from the second assessment to the last assessment, and improving over time.

The pattern of the fundamental frequency in the CoreToneVolume and CoreTone approximately follows the same pattern. However, the process from the first to the second assessment differs.


In the first assessment AB's spectral centroid is calculated to be just around 475 Hz (see figure 26). In the second assessment the spectral centroid increases from just around 475 Hz to around 675 Hz (see figure 26). In the last assessment the spectral centroid of the AB's CoreTone increases further from around 675 Hz to just above 700 Hz (see figure 26).

Figure 26: Spectral Centroid computation of AB sounding the CoreToneVolume

Conclusion and interpretation of the process:
The spectral centroid of AB’s CoreToneVolume increases steadily from the first to the last assessment. Therefore the interpretation of the process is that the sound quality is darker in the second assessment than in the last assessment. It can therefore be concluded that the sound quality over the three assessments is moving towards brightness.

My subjective evaluation confirms this. Listen to soundfile AB-1-Assessment-CoreToneVolume - AB-3-Assessment-CoreToneVolume (see appendix for chapter 8, USB-memorystick).

The pattern of the spectral centroid in the CoreToneVolume and CoreTone approximately follows the same pattern. However, the process from the first to the second assessment differs. It should be considered that there also is a difference in where the clip of the sound sample in order to calculate the spectral centroid is different from one another. In session one the clip is from the very beginning of the sounding whereas the clip for the calculation in the second assessment is from the difference may be caused by where the clip of the first assessment was according to where the vocal expression was most clear and open during the sounding of the exercise.
3. Analysis of Parameter 3: The Formant contours of the CoreToneVolume.
In the first assessment there are four formant contours visible where the CoreToneVolume's intensity is at its maximum. In the beginning and at the end five formant contours are visible, but they do not appear so gathered and compressed as in the middle of the sounding of the CoreToneVolume (see figure 27).
F1 and F2 are the most gathered and compressed formant contours of the four. F3 is a bit more gathered and compressed than F4 (see figure 27).

From the first to the second assessment the formant contours increase in clarity. There are four formant contours visible and they appear gathered and compressed over a longer period than in the first assessment (see figure 28).
F1 and F2 are the two formant contours that appear most gathered and compressed. Here hardly any red speckles appear between the contours. F3 are more gathered and compressed than F4 (see figure 28).

From the second to the last assessment the four formant contours even increase further in clarity (see figure 29). Still F1 and F2 are the two formant contours that appear most gathered and compressed, but F3 and F5 are still more gathered and compressed than in the second assessment (see figure 29).
All in all hardly any red speckles appear between the contours.

Conclusion and interpretation of the process:
The formant contours increase steadily in clarity from the first to the last assessment. Therefore the process can be described as improving over time, and it can be concluded that the sounding of the CoreToneVolume increases in purity, resonance and how alive it is.
The pattern of the formant contours in the CoreToneVolume and CoreTone follows the same pattern.

4. Analysis of Parameter 4: The Intensity - loudness of the CoreToneVolume.
The maximum intensity of AB's CoreToneVolume increases with 0.33 dB from the first to the second assessment, and increasing a further 7.11 dB from the second to the last assessment (see table 19).

<table>
<thead>
<tr>
<th>AB</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>74.50</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>74.83</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>81.94</td>
</tr>
</tbody>
</table>

Table 19. The intensity of AB sounding the CoreToneVolume

Conclusion and interpretation of the process:
The CoreToneVolume increases slightly in intensity from the first to the second assessment, but can hardly be described as an improvement. However, the CoreToneVolume increases over time, especially from the second to the last assessment. Therefore the process can be described as improving over time.
The pattern of the intensity in the CoreToneVolume and CoreTone follows the same pattern.

5. Analysis of Parameter 5: A time measurement (in seconds) of the duration of the CoreToneVolume.
AB’s duration increases by 1.54 seconds from the first to the second assessment, and increase even further 5.26 seconds from the second to the last assessment (see table 20).

<table>
<thead>
<tr>
<th>AB</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>10.31</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>11.72</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>17.13</td>
</tr>
</tbody>
</table>

Table 20. The duration of AB sounding the CoreToneVolume

Conclusion and interpretation of the process:
The increases in duration over time, especially from the second to the last assessment. Therefore the process can be described as improving.
Figure 27: Formant contours computation of AB sounding the CoreToneVolume in the 1. assessment.

Figure 28: Formant contours computation of AB sounding the CoreToneVolume in the 2. assessment.
Figure 29: Formant contours computation of AB sounding the CoreToneVolume in the 3. assessment.
The pattern of the duration of the CoreToneVolume and CoreTone follows the same pattern.

Summary and interpretation of the process as a whole:
Table 21 gives an overview of the conclusion and interpretation of the process according to the five parameters of the CoreToneVolume. AB’s process can be described as improving in four out of five parameters from the first to the second assessment, and deteriorating in one parameter. However, parameter 4. can hardly be described as improving. From the second to the last assessment the process can be described as improving in all parameters.

Clinically this leads me to consider that AB’s depression is decreasing over time. The fundamental frequency is higher, and the amount of overtones present, and the “power” of the components constituting the voice source spectrum is increasing. This all supports the conclusion that the voice is richer and more powerful, and therefore the interpretation may be that the CoreTone is more resonant and alive. Studying the psychoacoustic process more closely, it is evident that the improvement especially happens between the second and the last assessment. It is only tiny improving movements which are appearing from the first to the second assessment. So tiny that in some cases clinically hardly can be described as improvements.

This pattern follows the clinical description of the process (see chapter chapter 8.2), where it is clarified that AB state of being deteriorated from the 6. session to the 7. session cause to a pause in the therapeutic treatment in two and a half months.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+ (0)</td>
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<td>1. - 3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
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</tr>
</tbody>
</table>

Table 21: The process of AB’s CoreToneVolume over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
8.4.4 BC: Analysis of the CoreTone

1. Analysis of Parameter 1: Measuring the fundamental frequency / Hz (Pitch) of the CoreTone.

In the first assessment it is both visible and audible, that the sustaining of the CoreTone is constantly varied and unstable.

*Listen to soundfile BC-1-Assessment-CoreTone and BC-3-Assessment-CoreTone (see appendix for chapter 8, USB-memorystick).*

Therefore a computation of both the minimum and maximum pitch is made in selected period, which in this case is the whole period BC is sounding the CoreTone with open mouth (see table 22). The minimum frequency is measured to be 177.91 Hz, and the highest frequency is measured to be 233.30 Hz, which is a sound varying in pitch from F3 to A#3, spanning over six semitones.

In the second assessment the sustaining of the CoreTone is more stable, and measured to be 186.16 Hz (see table 22).

In the last assessment the frequency increases by 4.45 Hz, and one tone higher than in the second assessment (see table 22).

<table>
<thead>
<tr>
<th>BC</th>
<th>Fundamental frequency/Hz (Pitch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>177.91 (F3) - 233.30 (A#3)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>186.16 (F#3)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>190.61 (G3)</td>
</tr>
</tbody>
</table>

Table 22. The fundamental frequency/Hz (Pitch) of BC’s CoreTone

Conclusion and interpretation of the process:

Because the CoreTone is constantly varied and unstable it is impossible to say if the CoreTone is higher or lower in pitch in the second assessment than in the first assessment.

In observing a constantly varied and unstable sounding of the CoreTone there is a clinical choice to be made. This choice will have an affect on choice of pitch. Furthermore it is my clinical experience that the constantly varied and unstable sounding may be a sensitive barometer of a client’s state of being both psychologically and physiologically (see chapter 4.7.2.1).

The CoreTone becomes stable from the first to the second assessment, and can therefore be described as improving from the first to the last assessment. From the second to the last assessment the CoreTone gets higher in pitch.

The process can therefore be described as improving from the second to the last assessment.

Because the CoreTone is stable in the last assessment the process from the first to the last assessment can be described as improving.

2. Analysis of Parameter 2: A Spectrum computation of the CoreTone.

The energy/magnitude of BC’s fundamental frequency is around 700 in the first assessment. A little partial is visible below the fundamental frequency where the energy/magnitude is around 300. The irregularity of the spectrum is because the voice is constantly varied and unstable, as mentioned in the analysis of parameter one of the CoreTone.

Five overtones are present, however all with very low energy/magnitude

Partial two is just below 200, partial three around 100, partial four around 250, partial five just above 200 and partial six just above 100 (see figure 30).

In the second assessment the energy/magnitude of BC’s fundamental frequency is decreased to around 300. Seven overtones are present, two more than in the first assessment, and the energy/magnitude have increased for them all.

Partial two and three are around 200, partial four around 250, partial five and seven are above 400 (around 475, 400, and 500), and partial six is around 300. Partial eight is around 175 (see figure 30).

In the last assessment the energy/magnitude of BC’s fundamental frequency is decreased to around 300. Seven overtones are present.

Partial two and three are around 200, partial four, five and seven are above 400 (around 475, 400, and 500), and partial six is around 300. Partial eight is around 175 (see figure 30).

In the last assessment the energy/magnitude of BC’s fundamental frequency increases from around 300 to around 375. Seven overtones are present.

The energy/magnitude of partial two increases from 200 to just below 300. Partial three decreases from 200 to around 150.
Figure 30: Spectrum computation of BC sounding the CoreTone in the 1., 2. and 3. assessment.
Partial four increases from around 400 to around 750. Partial five decreases from around 400 to 200. Partial six increases from 300 to around 550. Partial seven decreases from around 500 to 325, and partial eight is about the same as in the second assessment (see figure 30).

Conclusion and interpretation of the process:
The overtones increase from five to seven from the first to the second assessment, and furthermore the energy/magnitude of all the partials increase, except for the fundamental frequency, which decreases.
The amount of overtones present is the same in the last assessment as in the second assessment, but four partials have increased the energy/magnitude, three have decreased the energy/magnitude, and one is the same as in the second assessment.
Therefore it can be concluded that the CoreTone gets richer and more alive over time, and therefore the process can be described as improving over time. Furthermore it can be concluded that BC holds onto the improvement she achieved in the second assessment.

3 Analysis of Parameter 3: The Spectral Centroid of the CoreTone.
In the first assessment BC’s spectral centroid is calculated to be just around 775 Hz. In the second assessment the spectral centroid increases from around 775 to just above 1000 Hz. In the last assessment the spectral centroid of the BC’s CoreTone increases even further from just above 1000 Hz to around 1025 Hz (see figure 31).

Conclusion and interpretation of the process:
The spectral centroid of BC’s CoreTone increases steadily from the first to the last assessment. Therefore the interpretation of the process is that the sound quality is darker in the first assessment than in the last assessment. It can therefore be concluded that the sound quality over the three assessments is moving towards brightness.
My subjective experience is that BC’s sound quality first of all is cracked and split between two vocal expressions in the first assessment. The clearest part of the voice I would describe as bright and light with a girlish quality, but without much intensity, which gives an impression of being fragile. The sound quality of the CoreTone in the second and last assessment are quite similar. I here agree with the interpretation of the calculation, and would describe the sound quality of the CoreTone as having a bright as well as dark touch, and sung by a mature woman.
Listen to soundfile BC-1-Assessment-CoreTone - BC-3-Assessment-CoreTone (see appendix for chapter 8, USB-memorystick).

4. Analysis of Parameter 4: The Formant contours of the CoreTone.
In the first assessment there are five formant contours visible in the beginning of the sounding of the CoreTone, and when BC opens her mouth the amount of formant contours decreases to four and F1 and F2 change pitch, and are close together indicating that BC sings an AH-sound. F3 and F4 are present, but there is significant space between the red speckles (see figure 32). From the first to the second assessment the formant contours increase in clarity. There are four clear formant contours. F1 and F2 are intensified, appear thin and compressed, and there are hardly any red speckles between F1 and F2. F3 is very unclear, but F4 and F5 are increased in clarity from the first to the second assessment (see figure 33).
From the second to the last assessment the formant contours decrease in clarity. F1 and F2 still appear clear, but F3 and F4 are more like in the first assessment. However F1 and F2 are more clear, thin and compressed in the last assessment than in the first assessment (see figure 34).
Figure 32: Formant contours computation of BC sounding the CoreTone in the 1. assessment.

Figure 33: Formant contours computation of BC sounding the CoreTone in the 2. assessment.
Figure 34: Formant contours computation of BC sounding the CoreTone in the 3. assessment.
Conclusion and interpretation of the process:
The clarity of the formant contours increases very much in clarity from the first to the second assessment, but then decreases slightly in clarity from the second to the last assessment. However, the formant contours still appear clearer in the last assessment than in the first assessment, and it can therefore be concluded that BC holds onto the improvement she achieved in the second assessment. Therefore the process can be described as improving over time, and it can be concluded that the voice gets more resonant and alive over time, but especially from the first to the second assessment.

5. Analysis of Parameter 5: The Intensity - loudness of the CoreTone.
BC’s intensity increases by 2.17 dB from the first to the second assessment, and even a further 1.41 dB from the second to the last assessment (see table 23).

<table>
<thead>
<tr>
<th>BC</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>78.91</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>81.08</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>82.49</td>
</tr>
</tbody>
</table>

Table 23. The intensity of BC sounding the CoreTone

Conclusion and interpretation of the process:
The CoreTone steadily increases in intensity over time. Therefore the process can be described as improving over time.

6. Analysis of Parameter 6: A time measurement (in seconds) of the Duration of the CoreTone.
BC’s duration increases by 5.05 seconds from the first to the second assessment, but then decreases with 3.21 seconds from the second to the last assessment, but still 1.84 seconds longer than in the first assessment (see table 24).

<table>
<thead>
<tr>
<th>BC</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>6.00</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>11.05</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>7.84</td>
</tr>
</tbody>
</table>

Table 24. The duration of BC sounding the CoreTone

Conclusion and interpretation of the process:
The process can be described as improving from the first to the second assessment, and the process from the second to the last assessment can be described as slightly deteriorating because the duration decreases. Because the duration in the last assessment is still longer than in the first assessment, it can be concluded that BC holds onto the improvement she achieved in the second assessment.

Summary and interpretation of the process as a whole:
Table 25 gives an overview of the conclusions and interpretations of the process according to the six parameters of the CoreTone. From the first to the second assessment six parameters were possible to measure and analyse. The process can be described as improving in all six parameters from the first to the second assessment. From the second to the last assessment the process can be described as deteriorating in the fourth and sixth parameter, but improving in the rest of the parameters. Compared to the first session, the last session can be described as improving in all parameters.

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<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 25: The process of BC’s CoreTone over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
8.4.5 BC: Analysis of the CoreTone-Volume

1. Analysis of Parameter 1: Measuring the pitch / fundamental frequency (f0) of the CoreToneVolume.
From the first to the second assessment BC’s fundamental frequency decreases by 7.05 Hz, and therefore going down one semitone. From the second to the last assessment the fundamental frequency decreases a further 0.41 Hz, but not enough to change pitch (see table 26).

<table>
<thead>
<tr>
<th>BC</th>
<th>Hz/Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>180.81 Hz (F#3)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>173.76 Hz (F3)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>174.17 Hz (F3)</td>
</tr>
</tbody>
</table>

Table 26. The fundamental frequency/Hz (Pitch) of BC’s CoreToneVolume

Conclusion and interpretation of the process:
The fundamental frequency of the CoreTone decreases from the first to the second assessment, being one semitone lower. From the second to the last assessment the fundamental frequency of the CoreTone increases slightly, but not changing pitch, still being one semitone lower than in the first assessment. Therefore the process can be described as deteriorating over time. The process of the fundamental frequency in the CoreToneVolume and CoreTone does not follow the same pattern. The process as a whole from the first to the last assessment differs.

In the first assessment BC’s spectral centroid is calculated to be just below 950 Hz. In the second assessment the spectral centroid increases from below 950 Hz to just below 1050 Hz. In the last assessment the spectral centroid of the BC’s CoreTone is increasing slightly to just above 1050 Hz (see figure 35).

Figure 35: Spectral Centroid computation of BC sounding the CoreTone.

Conclusion and interpretation of the process:
The spectral centroid of BC’s CoreTone increases steadily from the first to the last assessment. Therefore the interpretation of the process is that the sound quality is darker in the first assessment than in the last assessment. It can therefore be concluded that the sound quality over the three assessments is moving towards brightness.

My subjective experience is that BC’s sound quality first of all is cracked and split between two vocal expressions in the first assessment. The clearest part of the voice I would describe as bright and light with a girlish quality, but without much intensity, which gives an impression of being fragile and not so grounded. The sound quality of the CoreTone in the second and last assessment are quite similar. I here agree with the interpretation of the calculation, and would describe the sound quality of the CoreTone as having a bright as well as dark touch, and sung by a mature woman.

Listen to soundfile BC-1-Assessment-CoreToneVolume - BC-3-Assessment-CoreToneVolume (see appendix for chapter 8, USB-memorystick).

The pattern of the spectral centroid in the CoreToneVolume and CoreTone follows the same pattern.
Figure 36: Formant contours computation of BC sounding the CoreToneVolume in the 1. assessment.

Figure 37: Formant contours computation of BC sounding the CoreToneVolume in the 2. assessment.
Figure 38: Formant contours computation of BC sounding the CoreToneVolume in the 3. assessment.
3. Analysis of Parameter 3: The Formant contours of the CoreToneVolume.

In the first assessment there are four formant contours visible. F1 and F2 are compressed and gathered. In F3 and F4 the red speckles are more spread out, though they are gathered in contours (see figure 36).

From the first to the second assessment the formant contours increases in clarity. Now five formant contours are visible in the period where the CoreToneVolume reaches its maximum of intensity. F1 and F2 appear very gathered and compressed, with no red speckles between the contours. F3, F4 and F5 are more gathered and compressed than in the first assessment, and only few red speckles appear between the contours (see figure 37).

From the second to the last assessment the formant contours appear very clear and five formant contours are clearly visible. F1 and F2 are very gathered and compressed and appear as thin lines. There are no red speckles between the contours. F3, F4 and F5 also appear gathered, but not as compressed as F1 and F2, but there are very few red speckles between the contours (see figure 38).

Conclusion and interpretation of the process:
The clarity of the formant contours increases substantially in clarity from the first to the second assessment. In the last assessment there still are five formant contours clearly visible, but fewer red speckles appear between the contours all in all. However the formant contours still appear clearer in the last assessment than in the first assessment. Therefore the process can be described as improving over time, and it can be concluded that the voice gets more resonant and alive over time.
The pattern of the formant contours in the CoreToneVolume and CoreTone follows the same pattern.

4. Analysis of Parameter 4: The Intensity - loudness of the CoreToneVolume.

The maximum intensity of BC’s CoreToneVolume increases by 0.57 dB from the first to the second assessment, and then decreases slightly by 0.04 dB from the second to the last assessment (see table 27).

<table>
<thead>
<tr>
<th>BC</th>
<th>dB</th>
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</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>81.73</td>
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<tr>
<td>2. Assessment</td>
<td>82.30</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>82.34</td>
</tr>
</tbody>
</table>

Table 27. The intensity of BC sounding the CoreToneVolume

Conclusion and interpretation of the process:
The intensity of the CoreTone increases from the first to the last assessment, therefore the process can be described as improving.
The pattern of the intensity of the CoreToneVolume and CoreTone follows the same pattern.

5. Analysis of Parameter 5: A time measurement (in seconds) of the duration of the CoreToneVolume.

From the first to the second assessment BC decreases the duration of the CoreToneVolume by 4.74 seconds, and decreases a further 2.11 seconds from the second to the last assessment (see table 28).

<table>
<thead>
<tr>
<th>BC</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>17.59</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>12.85</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>10.74</td>
</tr>
</tbody>
</table>

Table 28. The duration of BC sounding the CoreToneVolume

Conclusion and interpretation of the process:
The duration of the CoreToneVolume decreases steadily over time, and therefore the process can be described as deteriorating over time.
The pattern of the duration of the CoreToneVolume and CoreTone does not follow the same pattern. Only the process from the second to the last assessment follows the same pattern.
Summary and interpretation of the process as a whole:
Table 29 gives an overview of the conclusions and interpretations of the process according to the five parameters of the CoreToneVolume.

The process can be described as improving in three out of five parameters from the first to the second assessment, and deteriorating in two out of five parameters.

From the second to the last assessment the process can be described as improving in three out of five parameter, and deteriorating in two out of five parameters.

Compared to the first session, the last session can be described as improving in three out of five parameters, and deteriorating in two out of five parameters.

The process of the CoreToneVolume parameters is not clear and the process is not following the same pattern as the CoreTone. Relating the conclusion of the CoreTone's process with BC's music therapy process described in the chapter 8.2, the processes follow the same patterns. I had just carried out the second assessment (seventh session) when I between the ninth and tenth session unfortunately got very sick. This caused a pause in the treatment for two and a half months. When I recovered BC had one session and then the last assessment was carried out. However, BC had for the first time for a couple of years taken part in a week course connected to her work. Though she was tired after this course she also experienced that it a success that she managed to complete the course, and take full part in it. This was her first step towards returning in her working position. It is my experience that this course supported BC to hold on to the achieved improvement.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
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<tr>
<td>3. Assessment</td>
<td>+</td>
<td>+</td>
<td>-</td>
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<td>-</td>
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<tr>
<td>1. - 3. Assessment</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 29: The process of BC's CoreToneVolume over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
8.4.6 DC: Analysis of the CoreTone

1. Analysis of Parameter 1: Measuring the fundamental frequency / Hz (Pitch) of the CoreTone.

DC's frequency decreases by 0.91 Hz from the first assessment to the second assessment, but not enough to change pitch. From the second to the last assessment the frequency increases by 6.80 Hz and therefore go up two semitones (see table 30).

<table>
<thead>
<tr>
<th>DC</th>
<th>Fundamental frequency/Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>71.03 (C#2)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>70.12 (C#2)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>76.92 (D#2)</td>
</tr>
</tbody>
</table>

Table 30. The fundamental frequency/Hz (Pitch) of DC’s CoreTone

Conclusion and interpretation of the process:
From the first to the second assessment there is no change in pitch, but the fundamental frequency decreases. From the second to the last assessment the CoreTone becomes higher in pitch and increases in fundamental frequency. Therefore the process can be described as improving from the second to the last assessment.

2. Analysis of Parameter 2: A Spectrum computation of the CoreTone.

The energy/magnitude of DC’s fundamental frequency is almost 900. However only two overtones are present, and both with very low energy/magnitude (both around 150) (see figure 39).

In the second assessment the energy/magnitude of DC’s fundamental frequency decreases to around 450, but before the fundamental frequency there is a little peak of a partial with energy/magnitude around 350. However five overtones are present, and all are increasing in energy/magnitude. Partial two is around 350, and partial three

around 400. Partial four is around 150, partial five is around 200, and partial six is around 50 (see figure 39).

In the last assessment the energy/magnitude of DC’s fundamental frequency increases from around 450 to above 600. Nine overtones are present. The energy/magnitude of all the overtones increase when relating each partial approximate to the frequency of their appearance, except for partial three, which has decreased from around 400 to just below 300. Partial two is around 350, partial four is just below 200, partial five just above 100, partial six around 250, partial seven around 100, partial eight around 200 and nine and ten about 100 (see figure 39).

Conclusion and interpretation of the process:
Though the fundamental frequency decreases the components constituting the spectrum of the CoreTone increases both in overtones and in energy/magnitude over time. By studying the spectrum as a whole in the second assessment, it is visible, that a lot besides the five partials are in motion, although it has not come to a peak of a partial. In the last assessment the tendencies of turning into a peak of a partial are realised, and nine overtones are present. Therefore it can be concluded that the CoreTone gets richer and more alive over time, and therefore the process can be described as improving over time.
A psychoacoustic analysis and a psychological interpretation

Figure 39: Spectrum computation of DC sounding the CoreTone in the 1, 2, and 3 assessment.
3. Analysis of Parameter 3: The Spectral Centroid of the CoreTone.
In the first assessment DC's spectral centroid is calculated to be just around 175 Hz. In the second assessment the spectral centroid increases from around 175 Hz to just above 300 Hz. In the last assessment the spectral centroid of the DC's CoreTone increases even further from just above 300 Hz to around 375 Hz (see figure 40).

Conclusion and interpretation of the process:
The spectral centroid of DC's CoreTone increases steadily from the first to the last assessment. Therefore the interpretation of the process is that the sound quality is darker in the first assessment than in the last assessment, and it can therefore be concluded that the sound quality over the three assessments is moving towards brightness. My subjective evaluation confirms this.

Listen to soundfile DC-1-Assessment-CoreTone - DC-3-Assessment-CoreTone (see appendix for chapter 8, USB-memorystick)

4. Analysis of Parameter 4: The Formant contours of the CoreTone.
In the first assessment the formant contours are very unclear. There is only a tendency to one formant contour around 2000 Hz, otherwise the red speckles are chaotic in their appearance (see figure 41).

From the second to the last assessment the formant contours increase even more in clarity, and show four formant contours clearly. However there still are some red speckles between the first three formant contours (see figure 43).

Conclusion and interpretation of the process:
The formant contours increase steadily in clarity from the first to the last assessment. Therefore the process can be described as improving over time, and it can be concluded that the sound quality is getting more resonant, pure and alive over time.

5. Analysis of Parameter 5: The Intensity - loudness of the CoreTone.
DC's intensity decreases by 6.39 dB from the first to the second assessment, but then increases by 12.18 dB from the second to the last assessment, and is even 5.79 dB higher in intensity than in the first assessment (see table 31).

<table>
<thead>
<tr>
<th>DC</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>80.95</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>74.56</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>86.74</td>
</tr>
</tbody>
</table>

Table 31. The intensity of DC sounding the CoreTone

Conclusion and interpretation of the process:
The CoreTone first decreases in intensity, and therefore the process from the first to the second assessment can be described as deteriorating. From the second to the last assessment the intensity of the CoreTone increases so it is even stronger in intensity than in the first assessment, and therefore the process can be described as improving over time.
6. Analysis of Parameter 6: A time measurement (in seconds) of the Duration of the CoreTone.

DC’s duration increases by 0.59 second from the first to the second assessment, and increases a further 2.83 seconds to the last assessment (see table 32).

<table>
<thead>
<tr>
<th>DC</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>6.53</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>7.12</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>9.95</td>
</tr>
</tbody>
</table>

Table 32. The duration of DC sounding the CoreTone

Summary and interpretation of the process as a whole:

Table 33 gives an overview of the conclusions and interpretations of the process according to the six parameters of the CoreTone.

The process can be described as improving in four out of six possible parameters from the first to the second assessment, and deteriorating in two out of six parameters. From the second to the last assessment the process can be described as improving in all parameters. Compared to the first session, the last session can be described as improving in all parameters.

Conclusion and interpretation of the process:

The duration steadily increases over time. Therefore the process can be described as improving over time.

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</thead>
<tbody>
<tr>
<td>1. Assessment</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2. Assessment</td>
<td>- (0)</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 33: The process of DC’s CoreTone over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
Figure 41: Formant contours computation of DC sounding the CoreTone in the 1. assessment.

Figure 42: Formant contours computation of DC sounding the CoreTone in the 2. assessment.
Figure 43: Formant contours computation of DC sounding the CoreTone in the 3. assessment.
8.4.7 DC: Analysis of the CoreToneVolume:

1. Analysis of Parameter 1: Measuring the pitch / fundamental frequency (f0) of the CoreToneVolume

From the first to the second assessment DC’s fundamental frequency decreases by 1.41 Hz, but not enough to change pitch.
From the second to the last assessment DC’s fundamental frequency increases by 8.02 Hz and therefore goes up two semitones (see table 35).

<table>
<thead>
<tr>
<th>DC</th>
<th>Hz/Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>70.84 (C#2)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>69.43 (C#2)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>77.45 (D#2)</td>
</tr>
</tbody>
</table>

Table 35. The fundamental frequency/Hz (Pitch) of DC’s CoreToneVolume

Conclusion and interpretation of the process:
From the first to the second assessment the fundamental frequency of the CoreTone decreases slightly, but not changing pitch. From the second to the last assessment the fundamental frequency of the CoreTone increases and goes up two semitones. Therefore the process can be described as improving over time.
The pattern of the fundamental frequency in the CoreToneVolume and CoreTone follows the same pattern.


In the first assessment DC’s spectral centroid is calculated to be just around 475 Hz. In the second assessment the spectral centroid decreases from around 475 Hz to around 465 Hz. In the last assessment the spectral centroid of the DC’s CoreTone increases from around 465 Hz to around 630 Hz (see figure 44).

Conclusion and interpretation of the process:
The spectral centroid of DC’s CoreTone decreases from the first to the second assessment, and then increases from the second to the last assessment. Compared to the first assessment the spectral centroid of the CoreTone can be described as increasing.

Therefore the interpretation of the process is that the sound quality is darker in the first assessment than in the last assessment, and it can therefore be concluded that the sound quality over the three assessments is moving towards brightness.

My subjective evaluation confirms this. Listen to soundfile DC-1-Assessment-CoreToneVolume - DC-3-Assessment-CoreToneVolume (see appendix for chapter 8, USB-memorystick).
The pattern of the spectral centroid in the CoreTone Volume and CoreTone approximately follows the same pattern. However, the process from the first to the second assessment differs.

3. Analysis of Parameter 3: The Formant contours of the CoreToneVolume.

In the first assessment two formant contours (F1 and F2) appear clearly, when the CoreToneVolume is at its maximum in intensity (see figure 45).

From the first to the second assessment the formant contours increase in clarity. Now three formant contours (F1, F2 and F3) are very clearly visible when the CoreToneVolume is at its maximum in intensity (see figure 46).

From the second to the last assessment the formant contours increase even further in clarity. Now four formant contours are clearly...
present (F1, F2, F3 and F4) when the CoreToneVolume is at its maximum (see figure 47).

**Conclusion and interpretation of the process:**
The clarity of the formant contours increase steadily from the first to the last assessment. Therefore the process can be described as improving over time, and it can be concluded that the sound quality becomes more resonant, pure and alive over time. The pattern of the formant contours of the CoreToneVolume and CoreTone follows the same pattern.

4. Analysis of Parameter 4: The Intensity - loudness of the CoreToneVolume.
The maximum intensity of DC’s CoreToneVolume increases by 0.96 dB from the first to the second assessment, and increases a further 1.68 dB from the second to the last assessment (see table 36).

<table>
<thead>
<tr>
<th>DC</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>79.25</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>80.21</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>81.89</td>
</tr>
</tbody>
</table>

Table 36. The intensity of DC sounding the CoreToneVolume

**Conclusion and interpretation of the process:**
The intensity of the CoreToneVolume increases steadily over time, and therefore the process can be described as improving over time. The pattern of the intensity of the CoreTone Volume and CoreTone approximately follows the same pattern. However, the process from the first to the second assessment differs.

5. Analysis of Parameter 5: A time measurement (in seconds) of the duration of the CoreToneVolume.
DC’s duration increases by 5.09 seconds from the first assessment to the second assessment, but decreases by 0.75 second from the second to the last assessment, being 4.34 seconds longer than in the first assessment (see table 37).

<table>
<thead>
<tr>
<th>DC</th>
<th>Seconds</th>
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</thead>
<tbody>
<tr>
<td>1. Assessment</td>
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<tr>
<td>2. Assessment</td>
<td>8.14</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>8.12</td>
</tr>
</tbody>
</table>

Table 37. The duration of DC sounding the CoreToneVolume

**Conclusion and interpretation of the process:**
The duration increases significantly from the first to the second assessment, and then decreases slightly with from the second to the last assessment, but is still longer than in the first assessment. Therefore the process can be described as improving from the first to the second assessment and DC holds on to this improvement from the second to the last assessment.
The pattern of the intensity of the CoreTone Volume and CoreTone approximately follows the same pattern. However, the process from the first to the second assessment differs.
Figure 45: Formant contours computation of DC sounding the CoreToneVolume in the 1. assessment.

Figure 46: Formant contours computation of DC sounding the CoreToneVolume in the 2. assessment.
Figure 47: Formant contours computation of DC sounding the CoreToneVolume in the 3. assessment.
Summary and interpretation of the process as a whole:
Table 38 gives an overview of the conclusions and interpretations of the process according to the five parameters of the CoreToneVolume.

The process can be described as improving in three out of five parameters from the first to the second assessment, and deteriorating in two out of five parameters. From the second to the last assessment the process can be described as improving in four out of five parameters, and deteriorating in one of the five parameters. Compared to the first session, the last session can be described as improving in all five parameters.

There are some contradictions when comparing the process described by evaluating the parameters and the clinical process described in the introduction of DC. From the first to the second assessment the assessment points at improvement, but this is not what DC and the staff around him experience. This indicates that the assessment of the CoreTone may see directions of the mood process before it is conscious to the individual and the surroundings.

DC then was offered anti-depressiva and it was discovered that he did not suffer from unipolar depression, but from bipolar disorder. So the improving process described from the second to the last assessment follows the fact that DC is not depressive anymore. But the assessment of the CoreTone does not capture that DC’s state of being is not stable, but has turn into a mania.

Concludingly it should be considered that the CoreTone alone only capture if the mood is going up or going down.

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</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>- (0)</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3. Assessment</td>
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<td>+</td>
<td>+</td>
<td>+</td>
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<td>1. - 3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 38: The process of DC’s CoreToneVolume over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
8.4.8 BD: Analysis of the CoreTone

BD’s first assessment was recorded in another music therapy room than the second and last assessments. This might affect some of the measurements, and will be taken into consideration as the analysis is carried out.

1. Analysis of Parameter 1: Measuring the fundamental frequency / Hz (Pitch) of the CoreTone.

BD’s frequency increases by 7.69 Hz, and therefore going up a semitone in pitch from the first to the second assessment. From the second to the last assessment the frequency decreases by 1.43 Hz, but not enough to change pitch (see table 39).

<table>
<thead>
<tr>
<th>BD</th>
<th>Fundamental frequency/Hz (Pitch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>104.02 (G#2)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>111.71 (A2)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>110.28 (A2)</td>
</tr>
</tbody>
</table>

Table 39. The fundamental frequency/Hz (Pitch) of BD’s CoreTone

Conclusion and interpretation of the process:
From the first to the second assessment the fundamental frequency of the CoreTone increases and becomes higher in pitch. From the second to the last assessment the fundamental frequency decreases slightly, but does not change pitch. Therefore the process can be described as improving from the first to the second assessment. It can be concluded that BD holds onto the improvement he achieved in the second assessment, because the pitch does not change.

2. Analysis of Parameter 2: The analysis of the Spectrum of the CoreTone.

The first assessment is recorded in another room than the second and last assessment. It should be considered if this affects the result. The energy/magnitude of BD’s fundamental frequency is just above 700. There are five overtones present. The first four partials are below 200, and the fifth partial is just above 300 (see figure 48).

In the second assessment the energy/magnitude of BD’s fundamental frequency decreases to around 650. Seven overtones are present, and all increase in energy/magnitude, except for partial five. Partial two is around 550, and partial three and four are around 150. Partial five is around 100, partial six is around 400, and partial seven and eight are around 100 (see figure 48).

In the last assessment the energy/magnitude of BD’s fundamental frequency decreases from around 650 to just above 500. Eight overtones are present. The energy/magnitude of partial two decreases from around 550 to around 300. Partial three decreases from around 350 to 300. Partial four and five both increase from around 150 and 100 to around 300. Partial six increases from around 400 to around 600. Partial seven is the same. Partial eight increases from around 100 to 150, and then the ninth partial is around 100 (see figure 48).

Conclusion and interpretation of the process:
The energy/magnitude of the fundamental frequency decreases over time. From the first to the second assessment the overtones increases from five to seven overtones, and with a further one overtone from the second to the last assessment. From the first to the second assessment five partials out of eight partials increase energy/magnitude. Two partials decrease energy/magnitude.

From the second to the last assessment five partials out of nine increase the energy/magnitude. Three partials decrease the energy/magnitude. Therefore it can be concluded that the CoreTone becomes richer and more alive over time, and therefore the process can be described as improving over time.
Figure 48: Spectrum computation of BD sounding the CoreTone in the 1., 2. and 3. assessment.
3 Analysis of Parameter 3: The Spectral Centroid of the CoreTone.
In the first assessment BD’s spectral centroid is calculated to be just above 420 Hz. In the second assessment the spectral centroid increases from above 420 Hz to 440 Hz. In the last assessment the spectral centroid of the BD’s CoreTone increases even further from 440 Hz to around 520 Hz (see figure 49).

![Spectral Centroid computation of BD sounding the CoreTone.](image)

Conclusion and interpretation of the process:
The spectral centroid of BD’s CoreTone increases steadily from the first to the last assessment. Therefore the interpretation of the process is that the sound quality is darker in the first assessment than in the last assessment, and it can therefore be concluded that the sound quality over the three assessments is moving towards brightness. It is important to remember that the first assessment is recorded in another music therapy room, where the acoustics are very different. It should be considered that this may affect the quality of the sound. However my subjective experience is that the second and last assessments are quite similar in quality. I cannot hear the difference that the spectral centroid captures.

Listen to soundfile BD-1-Assessment-CoreTone - BD-3-Assessment-CoreTone (see appendix for chapter 8, USB-memorystick)

4. Analysis of Parameter 4: Measuring the Formant contours of the CoreTone.
In the first assessment four formant contours are visible in the first part of the sounding of the CoreTone, when it is at its maximum in intensity. Thereafter the formant contours vanish more or less. F1 and F2 are the ones that appear most gathered and compressed, however still not really making a clear line (see figure 50).

From the first to the second assessment the formant contours increase in clarity. Four formant contours are clearly visible. F1 and F2 appear very gathered and compressed and make a thin red line. F4 is more gathered and compressed than F3, but appear a lot more gathered and compressed than in the first assessment. All in all there are hardly any red speckles between the contours (see figure 51).

From the second to the last assessment the formant contours decrease slightly in clarity, but still appear much more clear than in the first assessment. It is especially F3 and F4 that appear less gathered and compressed than in the second assessment (see figure 52).

Conclusion and interpretation of the process:
The formant contours increase a lot in clarity from the first to the second assessment, and then decrease slightly in clarity from the second to the last assessment. However they are still a lot clearer than in the first assessment.

Therefore the process can be described as improving over time, and it can be concluded that the sounding of the CoreTone is getting more pure, resonant and alive over time.

5. Analysis of Parameter 5: The analysis of the intensity - loudness of the CoreTone.
BD’s intensity of the CoreTone increases by 21.59 dB from the first to the second assessment, and then decreases slightly by 0.08 dB from the second to the last assessment (see table 40).

<table>
<thead>
<tr>
<th>BD</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>60.98</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>82.57</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>82.49</td>
</tr>
</tbody>
</table>

Table 40. The intensity of BD sounding the CoreTone

Conclusion and interpretation of the process:
From the first to the second assessment the intensity of the CoreTones increases, therefore the process can be described as improving, but from the second to the last assessment the...
Figure 50: Formant contours computation of BD sounding the CoreTone in the 1. assessment.

Figure 51: Formant contours computation of BD sounding the CoreTone in the 2. assessment.
Figure 52: Formant contours computation of BD sounding the CoreTone in the 3. assessment.
intensity decreases slightly, and so little that I will conclude that BD actually holds onto the improvement he achieved in the second assessment.

6. Analysis of Parameter 6: A time measurement (in seconds) of the duration of the CoreTone.
BD’s duration increases by 1.73 seconds from the first to second assessment, and then decreases by 0.55 second from the second to the last assessment, but is still 1.18 seconds longer than in the first assessment (see table 41).

<table>
<thead>
<tr>
<th>BD</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>6.66</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>8.39</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>7.84</td>
</tr>
</tbody>
</table>

Table 41. The duration of BD sounding the CoreTone

Conclusion and interpretation of the process:
Because the duration increases from the first to the second assessment the process can be described as improving. From the second to the last assessment the duration decreases slightly again, but is still longer than in the first assessment. Therefore it can be concluded that BD holds onto the improvement he achieved in the second assessment.

Summary and interpretation of the process as a whole:
Table 42 gives an overview of the conclusions and interpretations of the process according to the six parameters of the CoreTone.

The process can be described as improving in all six parameters from the first to the second assessment. From the second to the last assessment the process can be described as deteriorating in four out of six parameters, but improving in two out of six parameters from the second to the last assessment. Compared to the first assessment, the last assessment the process can be described as improving in all parameters.

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<tbody>
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<td>1. - 3. Assessment</td>
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<td>+</td>
<td>+</td>
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<td>+</td>
</tr>
</tbody>
</table>

Table 42: The process of BD’s CoreTone over time.
Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
8.4.9 BD: Analysis of the CoreTone-Volume:

1. Analysis of Parameter 1: Measuring the pitch / fundamental frequency (f0) of the CoreToneVolume
From the first to the second assessment BD’s fundamental frequency decreases by 3.97 Hz, and therefore not changing pitch. From the second to the last assessment the fundamental frequency increases by 0.03 Hz but not enough to change pitch (see table 42).

<table>
<thead>
<tr>
<th>BD</th>
<th>Hz/Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>108.63 (A2)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>112.60 (A2)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>112.57 (A2)</td>
</tr>
</tbody>
</table>

Table 42. The fundamental frequency/Hz (Pitch) of BD’s CoreToneVolume

Conclusion and interpretation of the process:
The fundamental frequency increases very little from the first to the second assessment, and then decreases hardly at all from the second to the last assessment, but never enough to change pitch. Therefore the process can be described as not really progressing.
The pattern of the fundamental frequency of the CoreToneVolume and CoreTone follows the same pattern.

In the first assessment the spectral centroid is around 625 Hz. From the first to the second assessment the spectral centroid decreases from around 625 Hz to around 525 Hz. From the second to the last assessment the spectral centroid increases to almost same value as in the first assessment, from around 525 Hz to around 620 Hz (see figure 53).

The pattern of the spectral centroid of the CoreTone Volume and CoreTone approximately follows the same pattern. However, the process from the first to the second assessment differs.

3. Analysis of Parameter 3: The Formant contours of the CoreToneVolume.
In the first assessment four formant contours are visible. F1 and F2 appear gathered and compressed, making a thin red line. F3 appears more gathered and compressed than F4. There are hardly any red speckles between F1 and F2, but some appear between F3 and F4 (see figure 54).

From the first to the second assessment the formant contours increase in clarity. F1 and F2 appear most gathered and compressed, but
Figure 54: Formant contours computation of BD sounding the CoreToneVolume in the 1. assessment.

Figure 55: Formant contours computation of BD sounding the CoreToneVolume in the 2. assessment.
Figure 56: Formant contours computation of BD sounding the CoreToneVolume in the 3. assessment.
F3 and F4 are quite close to being just as gathered and compressed, and appear a lot more gathered and compressed than in the first assessment. There are hardly any red speckles between the contours (see figure 55).

From the second to the last assessment the formant contours decrease slightly in clarity, but are still more clearer than in the first assessment.
F1 and F2 appear gather and compressed, making a thin red line, and hardly any red speckles appear between the contours.
F3 are more gathered than F4, but they both still appear slightly less gathered and compressed than in the second assessment. However F3 appears more gathered and compressed than in the first assessment (see figure 56).

**Conclusion and interpretation of the process:**
The formant contours increase in clarity from the first to the second assessment, but then decrease slightly in clarity from the second to the last assessment. However the last assessment still appears more clear than in the first assessment. Therefore the process can be described as improving over time, and it can be concluded that the sounding of the CoreToneVolume becomes more pure, resonant and alive over time.
The pattern of the formant contours of the CoreToneVolume and CoreTone follows the same pattern.

### 4. Analysis of Parameter 4: The Intensity - loudness of the CoreToneVolume.
The maximum intensity of BD’s CoreToneVolume increases by 11.17 dB from the first to the second assessment, and decreases by 0.29 dB from the second to the last assessment (see table 43).

<table>
<thead>
<tr>
<th>BD</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>70.65</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>81.82</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>81.53</td>
</tr>
</tbody>
</table>

Table 43. The intensity of BD sounding the CoreToneVolume

**Conclusion and interpretation of the process:**
The intensity of the CoreToneVolume increases from the first to the second assessment, and therefore the process can be described as improving over time. However, the intensity slightly decreases from the second to the last assessment, but is still louder than in the first assessment. Therefore the process can be described as BD holding on to his improvement achieved from the second to the last assessment.
The pattern of the intensity of the CoreToneVolume and CoreTone follows the same pattern.

### 5. Analysis of Parameter 5: A time measurement (in seconds) of the duration of the CoreToneVolume.
BD’s duration decreases by 1.34 seconds from the first to the second assessment, and decreases further 0.75 second from the second to the last assessment (see table 44).

<table>
<thead>
<tr>
<th>BD</th>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>11.13</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>9.46</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>9.34</td>
</tr>
</tbody>
</table>

Table 44. The duration of BD sounding the CoreToneVolume

**Conclusion and interpretation of the process:**
The duration steadily decreases over time. Therefore the process can be described as deteriorating over time.
The pattern of the duration of the CoreToneVolume and CoreTone does not follow the same pattern at all.
Summary and interpretation of the process as a whole:
Table 46 gives an overview of the conclusions and interpretations of the process according to the five parameters of the CoreToneVolume.

The process can be described as improving in three out of five parameters from the first to the second assessment, and deteriorating in two out of five parameters. From the second to the last assessment the process can be described as deteriorating in four out of five parameter, and improving in one parameter.

Compared to the first session, the last session can be described as improving in four out of five parameters, and deteriorating in one parameter out of five parameters. The fundamental frequency does not change. The pattern of the process of the CoreToneVolume follows approximately the same pattern as the CoreTone. Especially according the process from the second assessment to the last assessment.

Missing a clinical perspective to the improvement observed, and in relation to the clinical story.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>+ (0)</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>- (0)</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
<td>+ (0)</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 46: The process of BD’s CoreToneVolume over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
8.5 The analysis of the Song

As mentioned in the chapter about Methodology for developing a protocol for Vocal Assessment (see chapter 6.6) it is considered that it should be possible to select some vocal parameters relevant for a song, measure these, and then consider some psychological interpretations. Still, this is not something I have much clinical experience in when it comes to song. Therefore the first step in the research of assessing a song is to examine / study if the same tendencies can be observed in the measurements of six vocal parameters, which are also measured in the exercises CoreTone and CoreToneVolume. Thus the psychological interpretation in this exercise only considers if the process can be described as improving or deteriorating.

The song chosen for this study, “Happy Birthday”, is international, and also well known on the Faroe Islands, and it can be sung with Faroese words (see appendix 12 for lyrics in English and Faroese).

It is a song with a span of an octave, including many different melodic steps and interpretational options, which will not be in focus in the analysis in this study.

The client could freely choose to sing the song with English or Faroese words, or even without words. If the song is sung in Faroese there is a little variation in the melody in the beginning. “Hap-py” is sung on the same two notes, but “Til-luk-ku” is sung on three notes, going up two semitones in the second syllable. However, the melody and the words are not in focus, only the sound quality.

As mentioned in chapter 7.1.3.1 the analysis of the Song is undertaken by analysing four parameters:

- starting pitch / mean frequency/Hz (Pitch)
- spectrum centroid
- intensity - loudness
- formant contours.

When starting singing a song the first tone of the song is essential. In this case the pitch is spontaneously chosen by the client. My hypothesis is that this starting pitch will follow the same tendencies as the fundamental frequency of the CoreTone and CoreToneVolume.

The measurements and calculations of starting pitch, intensity and formant contours are carried out in PRAAT. The software MIRtoolbox is used in the analysis of the parameter spectral centroid. The analysis is performed by Tuomas Eerola, Jyväskylä University, Finland. In order for Eerola to carry out the analysis a specific note has been chosen in the song “Happy Birthday”. In the first line of the song going “Happy birthday to you……” the tone where you sing “you” is chosen for all the participants.

A manual and a protocol for approaching the chosen vocal parameters with a psychoacoustical analysis is developed and described in detail. This manual is to be found as Appendix for chapter 8, USB-memory stick, VOIAS-2)

The analysis of the Song is presented, starting with AB, BC, DC and BD.

8.5.1 Introduction of the analysis of the song “Happy Birthday”

The analysis of the song “Happy Birthday” follows the same procedure as in the analysis of the exercises above.

A small introduction to the analysis of each vocal parameter is made in the following. In the introduction to the analysis of the formants I in the same way as in the premier introductions to the analysis have added figures from the non-clinical woman and man to support the explanation and clarification of this part of the analysis. Those examples are still not used as baselines, but more as guidelines for how formants can appear.

In presenting the analysis the participants will follow the same structure, presenting first the woman AB, then the second woman BC, and finally the two men, DC and BD.
1. Analysis of Parameter 1: Measuring the starting pitch / mean frequency of the first tone in the song “Happy Birthday”

First a table will present the measurement of the mean frequency / starting pitch of the first tone in the song “Happy Birthday” in the assessment.

The first column lists the name of the client and the three assessments. The second column shows an accurate measurement of the fundamental frequency of the CoreTone in Hertz (Hz) as well as the scientific name of the pitch determined; the note equivalent to the measured frequency value in the English/American standard. For this purpose I have used a table from “Acoustics and Psychoacoustics” (Howard & Angus 2006, pp 151). In each case the name is chosen according to which note the fundamental frequency is closest to in frequency. All differences and movements in pitch will be calculated in semitones.

2. Analysis of Parameter 2: The analysis of the Spectral Centroid of one single tone in the song “Happy Birthday”

First a Figure will present the calculation capturing the MIR calculation done by Eerola.

The y-axis shows the spectral centroid value in Hertz, and the x-axis shows the numbers of assessments, from the left starting with the first assessment, then the second and last assessment.

Then follows the analysis, and a short conclusion and interpretation of the analysis. The conclusion and interpretation will in this analysis also include my subjective evaluation of how I experience the sound quality in relation to earlier described way of listening and understanding. The focus will be on evaluating the brightness versus darkness of the participant’s voice.

3. Analysis of Parameter 3: The analysis of the formants of the song “Happy Birthday”

In presenting the analysis of the formants the figures of the computation of the three assessments are placed above each other, and then follows the analysis and a description of the process according to each figure.

As a guidance and clarification to what the analysis is focusing on a computation of a woman and man is presented below. The formant contours are much more complicated to study and evaluate when it is a song, partly because of the melody, and partly because of the many different sounds which appear, when the text of the song is sung.

Every time another word is sung, it produces a different vowel sound, and this affects the structure of the formant contours. However the man is a good example of how clear the structure and formant contours still can be while singing the song with text (see figure 57).

Four formant contours are clearly visible. F1 is pretty much a compressed red line. F2 is following the text according to what vowels are present in the sound quality, and F2 also appears clearly. The red speckles in F3 are less gathered than in F1 and F2, but still gathered enough to make a clear line. In F4 the red speckles decreases slightly in clarity connected to a certain vowel in the word “tin”. The clarity is supported by the fact that the pitch contour also appears clear as a continuous line for each word.

When comparing the computation of the formant contours of the man and the woman (see figure 57 and 58), the man’s formant contours appear most clear.

Both the man and woman sing the song in faroese, and the song has about the same duration, so this is not what affects the difference in clarity. The difference is to be found in how resonant and pure the sound is; the sound quality. And in a clinical perspective the resonance is also an indicator of how vital, vibrant or alive the song is.

4. Analysis of Parameter 4: The analysis of the intensity - loudness of the song “Happy Birthday”

First a table is presented. The first column lists the name of the participants and the three assessments. The second column records the measurements of the mean intensity of the song “Happy Birthday” in dB.

The analysis will be followed by a short conclusion and interpretation with reference to the page of relevance in the chapter 4.
Figure 57: Pitch contour and Formant contours computation of non-clinical man sounding the Song

Figure 58: Pitch contour and Formant contours computation of non-clinical woman sounding the Song
8.5.2 AB: Analysis of the Song

In the analysis of the song the first assessment is missing, because I forgot to have AB sing the song.

1. Analysis of Parameter 1: Measuring the starting pitch / mean frequency of the first tone in the song “Happy Birthday”.
   The first assessment is missing as mentioned above.
   From the second to the last assessment the starting frequency increases by 25.34 Hz, and is therefore being three semitones higher in pitch (see table 46).

<table>
<thead>
<tr>
<th>AB</th>
<th>Mean frequency / Hz (Pitch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>missing</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>190.65 (F#3)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>215.99 (A3)</td>
</tr>
</tbody>
</table>

   Table 46. The fundamental frequency/Hz (Pitch) of AB’s Song

   Conclusion and interpretation of the process: Because the pitch gets higher from the second to the last assessment the process can be described as improving.

2. Analysis of Parameter 2: The analysis of the Spectral Centroid of one single tone in the song “Happy Birthday”.
   The first assessment is missing.
   In the second assessment the spectral centroid is around 575 Hz.
   From the second to the last assessment the spectral centroid decreases to 500 Hz (see figure 59).

   Conclusion and interpretation of the process: The spectral centroid decreases from the second to the last assessment, which indicates that the sound quality of the one single tone in the song is getting darker from the second to the last assessment.

3. Analysis of Parameter 3: The Formants of one single tone in the song “Happy Birthday”.
   In the second assessment four formant contours are visible. In the F1 the red speckles are gathered and compressed, and make a thin red line. In F2 the red speckles are not quite as gathered and compressed as in F1, and when AB is singing the second last line of the song, the red line vanishes, and the red speckles are all over the place. F3 is visible, but not very clearly, and the same goes for F4, and there are quite a lot of red speckles between the contours F2, F3 and F4 (see figure 60).
   In the last assessment four formant contours are visible. F1 is gathered and compressed. F2 is more gathered and compressed throughout the song. F3 is gathered and compressed throughout the song, but there are a lot of red speckles between the F2 and F3. In F4 the red speckles are quite gathered and compressed throughout the song (see figure 61).

   Conclusion and interpretation of the process: The formant contours increases in clarity from the second to the last assessment. Therefore the process can be described as improving from the second to the last assessment.
Figure 60: Pitchcontour and Formant contours computation of AB sounding the Song, 2. assessment

Figure 61: Pitchcontour and Formant contours computation of AB sounding the Song, 3. assessment
4. Analysis of Parameter 4: The Intensity - loudness of one single tone in the song “Happy Birthday”.

The first assessment is missing. In the second assessment the intensity is measured to be 70.81 dB. From the second to the last assessment the song increases by 3.55 dB, being 74.36 dB (see table 47).

<table>
<thead>
<tr>
<th>AB</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>missing</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>70.81</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>74.36</td>
</tr>
</tbody>
</table>

Table 47: The intensity of AB sounding the Song

Conclusion and interpretation of the process:
Because the intensity of the song increases from the second to the last assessment the process can be described as improving.

Summary and interpretation of the process as a whole:
Table 48 gives an overview of the conclusion and interpretation of the process according to the five parameters of the Song.

The first session is missing.

AB’s process can be described as improving in three out of four parameters from the second to the last assessment.

The pattern of the process of the Song approximately follows the same pattern as the CoreTone. However, the pattern of the process of the spectral centroid differs.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 48: The process of AB’s Song over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
8.5.3 BC: Analysis of the Song

In the analysis of the song the first assessment is missing, because I made a mistake and forgot to have BC sing the song. In the second assessment the song is sung in faroese, and in the last assessment in English (see the text of the song in appendix 12).

1. Analysis of Parameter 1: Measuring the starting pitch / mean frequency of the first tone in the song “Happy Birthday”.

   The first assessment is missing.
   In the second assessment the starting frequency is 192.37 Hz, the pitch calculated to be G3. From the second to the last assessment the starting frequency increases by 9.74 Hz, and is one semitone higher in pitch (see table 49).

   Conclusion and interpretation of the process:
   Because the pitch is getting higher from the second to the last assessment the process can be described as improving.

2. Analysis of Parameter 2: The Spectral Centroid of one single tone in the song “Happy Birthday”.

   The first assessment is missing.
   In the second assessment the spectral centroid is around 700 Hz. From the second to the last assessment the spectral centroid increases to around 1050 Hz (see figure 62).

   Conclusion and interpretation of the process:
   The spectral centroid increases from the second to the last assessment. Therefore it can be concluded that the sound quality is brighter in the last assessment than in the second assessment.
   My subjective experience of the sound quality of the song from the second to the last assessment as a whole confirms this.

3. Analysis of Parameter 3: The Formants of one single tone in the song “Happy Birthday”.

   There are four clear formant contours. The formant contours are most clear in the beginning where the red speckles are most gathered and compressed. Especially F1 is intensified and appears as a thin continuously line in the two first verses of the song. Then the formant contours get less gathered and compressed, and red speckles appear between the contours (see figure 63).

   From the second to the last assessment the formant contours increase in clarity, and fewer red speckles appear between the contours throughout the song as a whole. There are clearly four formant contours visible (see figure 64).

   Conclusion and interpretation of the process:
   The formant contours increase in clarity from the second to the last assessment, and therefore the process can be described as improving from the second to the last assessment.

<table>
<thead>
<tr>
<th>BC</th>
<th>Mean frequency / Hz (Pitch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>missing</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>192.37 (G3)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>202.11 (G#3)</td>
</tr>
</tbody>
</table>

Table 49. The fundamental frequency/Hz (Pitch) of BC’s Song
Figure 63: Pitchcontour and Formant contours computation of BC sounding the Song, 1. assessment

Figure 64: Pitchcontour and Formant contours computation of BC sounding the Song, 2. assessment
Chapter 8

4. Analysis of Parameter 4: The Intensity - loudness of one single tone in the song “Happy Birthday”.

The first assessment is missing.

In the second assessment the intensity is 73.35 dB. From the second to the last assessment the intensity of the song increases by 3.36 dB to 76.71 dB (see table 50).

<table>
<thead>
<tr>
<th>BC</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>missing</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>73.35</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>76.71</td>
</tr>
</tbody>
</table>

Table 50: The intensity of BC sounding the Song

Summary and interpretation of the process as a whole:

Table 51 gives an overview of the conclusion and interpretation of the process according to the five parameters of the Song.

The first session is missing.

BC’s process can be described as improving in all four parameters from the second to the last assessment.

The pattern of the process of the Song approximately follows the same pattern as the CoreTone. However, the pattern of the process of the formant contours differs.

Conclusion and interpretation of the process:

Because the intensity of the single note in the song increases from the second to the last assessment the process can be described as improving.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 51: The process of BC’s Song over time.

Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
8.5.4 DC: Analysis of the Song

In the first and second assessment DC hums the song with open mouth, and in the last assessment DC sings “Happy Birthday” in Faroese.

1. Analysis of Parameter 1: Measuring the starting pitch / mean frequency of the first tone in the song “Happy Birthday”.

From the first to the second assessment DC’s starting frequency decreases by 4.72 Hz, with the starting pitch being one semitone lower than in the first assessment.

From the second to the last assessment DC increases the starting frequency by 12.27 Hz, and therefore the starting pitch is three semitones higher, and even two semitones higher than in the first assessment (see table 52).

<table>
<thead>
<tr>
<th>DC</th>
<th>Mean frequency / Hz (Pitch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>70.73 (C#2)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>66.01 (C2)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>78.28 (D#2)</td>
</tr>
</tbody>
</table>

Table 52. The fundamental frequency/Hz (Pitch) of DC’s Song

Conclusion and interpretation of the process:
The starting pitch gets lower from the first to the second assessment. However from the second to the last assessment the starting pitch gets higher, even ending higher than in the first assessment.

2. Analysis of Parameter 2: The Spectral Centroid of one single tone in the song “Happy Birthday”.

In the first assessment the spectral centroid is around 360 Hz. From the second to the last assessment the spectral centroid increases to be just above 420 Hz. From the second to the last assessment the spectral centroid increases further to around 640 Hz (see figure 65).

Figure 65: Spectral Centroid computation of DC sounding the Song.

Conclusion and interpretation of the process:
The spectral centroid increases steadily from the first to the last assessment. This indicates that the quality of the sound of the one single tone in the song is turning brighter over time. My subjective evaluation of the DC’s sound quality in the song as a whole is that DC sounds darker in the second assessment than in the first assessment. If I should place the sound quality in the first assessment according to a spatial body sensation, I would place the sound in the head, and to the dark side; - in the beginning of the back of the body. This is because the quality seems dark, but still light in “weight”, because the sound is not embodied. In the second assessment DC is clearly embodied, and has placed his sound quality in the middle of the body, and this quality is just intensified in the last assessment. A placement in the middle of the body indicates that there is both “sunshine” and darkness in the sound quality. So to some extent I can confirm that the sound quality is turning brighter, but it is together with this dark touch to the sound.

3. Analysis of Parameter 3: The Formants of one single tone in the song “Happy Birthday”.

There seems to be five formant contours visible in the first assessment. However the red speckles are not so gathered. They appear very breathy and therefore unclear. The red speckles also appear between the contours (see figure 66).

In the second assessment there are five formant contours visible. They have increased in clarity. The red speckles have gathered and there appear fewer red speckles between the contours appear (see figure 67).
Figure 66: Formant contours computation of DC sounding the Song in the 1. assessment.

Figure 67: Formant contours computation of DC sounding the Song in the 2. assessment.
Figure 68: Formant contours computation of DC sounding the Song in the 3. assessment.
In the last assessment there are five formant contours visible, and they have increased further in clarity. F1 is the clearest contour, and appears gathered and compressed drawing a red continuous line when DC is singing. F2 and F3 are also both more gathered and compressed, and do in between draw a red line, but it is not continuous. The last two formant contours (F4 and F5) are not so different from the second assessment (see figure 68).

**Conclusion and interpretation of the process:**
The formant contours increase steadily in clarity over time.

4. Analysis of Parameter 4: The Intensity - loudness of one single tone in the song “Happy Birthday”.
From the first to the second assessment the song decreases by 1.63 dB in intensity. From the second to the last assessment the song increases by 5.69 dB in intensity, and being 4.06 dB higher in intensity than in the first assessment (see table 53).

<table>
<thead>
<tr>
<th>DC</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>missing</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>73.35</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>76.71</td>
</tr>
</tbody>
</table>

Table 53. The intensity of DC sounding the Song

**Conclusion and interpretation of the process:**
The intensity slightly decreases from the first to the second assessment. However, the intensity increases from the second to the last assessment, even ending higher in intensity than in the first assessment.

**Summary and interpretation of the process as a whole:**
Table 54 gives an overview of the conclusion and interpretation of the process according to the five parameters of the Song.

Comparing the same parameters examined in the CoreTone exercise the pattern of the process of the Song follows the same pattern. The fundamental frequency and the intensity decrease from the first to the second assessment.

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<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
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<td>3. Assessment</td>
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<tr>
<td>1. - 3. Assessment</td>
<td>+</td>
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</tbody>
</table>

Table 54: The process of DC’s Song over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
8.5.5 BD: Analysis of the Song

1. Analysis of Parameter 1: Measuring the starting pitch / mean frequency of the first tone in the song “Happy Birthday”.
   From the first to the second assessment BD’s starting frequency decreases by 1.92 Hz, and the starting pitch is one semitone lower than in the first assessment.
   From the second the last assessment BD increases the starting frequency by 3.35 Hz, and therefore the starting pitch is one semitone higher, ending at the same pitch as in the first assessment (see table 55).

<table>
<thead>
<tr>
<th>BD</th>
<th>Mean frequency / Hz (Pitch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>114.15 (A#2)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>112.24 (A2)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>115.59 (A#2)</td>
</tr>
</tbody>
</table>

Table 55. The fundamental frequency/Hz (Pitch) of BD’s Song

**Conclusion and interpretation of the process:**
The starting frequency decreases from the first to the second assessment. From the second to the last assessment the starting frequency increases, and is even higher in the last assessment than in the first assessment.
However, the pitch is the same in the last assessment as in the first assessment.

2. Analysis of Parameter 2: The Spectral Centroid of one single tone in the song “Happy Birthday”.
   In the first assessment the spectral centroid is around 310 Hz. From the second to the last assessment the spectral centroid increases to around 335 Hz. From the second to the last assessment the spectral centroid decreases to be around 275 Hz (see figure 69).

   Figure 69: Spectral Centroid computation of BD sounding the Song.

**Conclusion and interpretation of the process:**
The spectral centroid increases from the first to the second assessment. This indicates that the sound quality is brighter in the second assessment than in the first assessment.
However the spectral centroid decreases from the second to the last assessment, ending lower than in the first assessment. This indicates that the sound quality is getting darker from the second to the last assessment, even darker than in the first assessment.

3. Analysis of Parameter 3: The Formants of the song “Happy Birthday”.
   In the first assessment there seems to be five formant contours visible. However F4 and F5 are difficult to differ from each other. The red speckles are quite gathered in F1 and F2, and then less in F3, and even less in F4 and F5. The red speckles also appear between the contours (see figure 70).

   It is hard to see any difference from the first to the second assessment. However, when taking a closer look at F4 and F5 they appear a bit more seperated, and the red speckles gather in spots more often than in the first assessment. The red speckles in F1, F2 and F3 also appear slightly more gathered in the second assessment than in the first assessment (see figure 71).

   The last assessment decreases in clarity. The clarity is even less than in the first assessment. There are only four formant contours visible, and F2 and F3 are difficult to separate from each other. F2 seems fragmented in the last assessment when you compare F2 across the assessments (see figure 72).
Figure 70: Formant contours computation of BD sounding the Song in the 1. assessment.

Figure 71: Formant contours computation of BD sounding the Song in the 2. assessment.
Figure 72: Formant contours computation of BD sounding the Song in the 3. assessment.
**Conclusion and interpretation of the process:**
The formant contours increase in clarity from the first to the second assessment, and then decrease in clarity from the second to the last assessment, and even appear less clear in the last assessment than in the first assessment.

**4. Analysis of Parameter 4: The analysis of the intensity - loudness of the song “Happy Birthday”**.
From the first to the second assessment the song increases by 17.86 dB in intensity.
From the second to the last assessment the song decreases by 1.56 dB in intensity, still being 16.30 dB higher in intensity than in the first assessment (see table 56).

<table>
<thead>
<tr>
<th>BD</th>
<th>dB</th>
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<tbody>
<tr>
<td>1. Ass</td>
<td>60.00</td>
</tr>
<tr>
<td>2. Ass</td>
<td>77.86</td>
</tr>
<tr>
<td>3. Ass</td>
<td>76.30</td>
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</table>

Table 56. The intensity of BD sounding the Song

**Summary and interpretation of the process as a whole:**
Table 57 gives an overview of the conclusion and interpretation of the process according to the five parameters of the Song.

The process can be described as improving in three parameters out of four parameters from the first to the second assessment. One parameter is deteriorating.

From the second to the last assessment BD’s process can be described as improving in one parameter out of four parameters, and deteriorating in three out of four parameters. Compared to the first assessment there is an improvement in two parameters out of four parameters, where as one parameter clinically hardly can be described as improving since the pitch is not changing.

The pattern of the process of the Song follows approximately the same pattern as the CoreTone. Especially according the process from the second assessment to the last assessment.

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<tr>
<td>1. - 3. Assessment</td>
<td>+ (0)</td>
<td>-</td>
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<td>+</td>
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</tbody>
</table>

Table 57: The process of BD’s Song over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
Chapter 8

8.6 The analysis of the Improvisation

The analysis of the voice improvisation is carried out by analysing the following six parameters:

- starting pitch / mean frequency/Hz (Pitch)
- pitch range
- a time based analysis of the free voice improvisation
- the sounding and breathing durations
- the pitch contour
- the formant contours

Some of the parameters are exact calculations being analysed, while others are descriptive. All the measurements and calculations are carried out in PRAAT. A manual and a protocol for approaching the chosen vocal parameters with a psychoacoustical analysis are developed and described in detail. This manual for VOIAS-2 is to be found as appendix for chapter 8, USB-memorystick.

In the following I will shortly present a few guidelines for each parameter and how they are related to my clinical experience and theoretical knowledge as well as an introduction to how the analysis is presented. This is followed by an analysis of the Improvisation, starting with AB, BC, DC and BD.

1. Analysis of Parameter 1: Measuring the mean frequency (Hz) / starting pitch of the first tone in the voice improvisation
   The analysis is concerned with an exact calculation of the mean frequency of the first tone in the voice improvisation. As described in chapter 8.5 I consider the first tone of the improvisation essential, because it is spontaneously chosen by the client. My hypothesis is that this starting pitch will follow the same tendencies as the fundamental frequency of the CoreTone and CoreToneVolume.

2. Analysis of Parameter 2: Calculating the pitch range of the voice improvisation
   This analysis is concerned with the span of pitch range of the vocal improvisation. I relate the exploration of the vocal improvisation to the exploration of the possibilities and basic conditions (Kenny 1989) of a living space. The melody or rhythmical pattern is considered a way of expressing ourselves and interacting in the world, and in the clinical improvisation the client is actualises herself/himself by his/her creative force (Kenny 1989). The living space is a concept drawn from the understanding of Merleau-Ponty (2002), and is connected to the experience of the subjective world as it is lived, pre-theoretically and pre-reflectively (Stern 2010). It is my clinical experience that the pitch range of a vocal improvisation is affected by the state of being in the sense that both anxiety and depression often influence the pitch range to become narrow and limited (see chapter 4.7.1.3).

3. Analysis of Parameter 3: Time based analysis of the free voice improvisation
   This analysis is concerned with calculating the length of time (in seconds) taken for the free improvisation as a whole. This includes the sounding and breathing periods. It is my clinical experience that the length of time taken for the free improvisation as a whole is affected by the state of being in the sense that depression often influences the creative force to almost vanish. As described in chapter 4.1.3 the creative processes are closely related to what Stern calls the forms of vitality (Stern 2010), a life and healing generator within ourselves. “Creativity cannot be separated from the processes of life” and “is by no means the only path to growth” (Kenny 2006, p. 14 & p. 17). These themes also represent a focus of life quality itself.

4. Analysis of Parameter 4: The analysis of the sounding and breathing durations in improvisation
   In the analysis of the sounding and breathing durations in the voice improvisation I have not made exact calculations all the time. Most of the time it is somewhat clear if the breathing is decreasing or not, and in those cases where I am unsure I have made some
calculations. Therefore the analysis of the sounding and breathing duration is a description of the visual impression from the figure representing the improvisation in real time. By studying the illustration of the improvisation as a whole, including all the sounding and breathing periods, most often it is visible if the sounding or breathing duration increase or decrease over time in the improvisation. In those cases where it is difficult to see, exact calculations are made in PRAAT.

It is my clinical experience that the pattern of the sounding and breathing duration is related to the client's state of being. When flow is present, it is my clinical experience that the exercise is embodied and stabilized within the moment of the action. Often the duration of the breathing then naturally will be shorter than the sounding duration.

5. Analysis of Parameter 5: The visual impression of the pitch contour of the improvisation

The analysis of this parameter is concerned with describing how the pitch contour is captured in the illustration. The pitch contour is affected by how much you open your mouth when singing, the sound quality. This became clear to me while studying the non-clinical man's pitch contour of his improvisation and listening to the sound file. When the man hums as he does in the beginning of his improvisation the pitch contour gets more curved. When the man opens his mouth, and sings more out in the music therapy space, the pitch contour appears more as a continuous line.

As mentioned in chapter 4.7.1 small movements like opening the mouth, and letting the sound pass freely through the throat and mouth can have a great affect on the subjective experience of being in a “private space” and entering a “social space”5 in a Field of Play with the music therapist (Kenny 2006). Therefore the analysis of this parameter as a start investigates the possibility of describing the vocal expression from upper described terms.

6. Analysis of Parameter 6: The formant contours of the improvisation

The analysis will as mentioned earlier consist of formant contours drawn as red speckles. The analysis of the formant contours in this study will focus on and describe how clear the formant contours appear.

If the voice is very resonant, pure and alive, the formant contours will be drawn very clearly by the red speckles gathering in four or five contours, as well as hardly any red speckles appearing between the contours. The wider the band of the formant contours are, the more unclear the formant contours will appear, the more space there will be between the red speckles, and the fewer of the formant contours that appear, the more breath, less resonance and life will be present in the sound of the voice.

8.6.1 Introduction to the analysis of the improvisation

First an illustration will show the improvisation in its full length. The illustration of the improvisation shows the improvisation in its full duration, divided into breathing periods and sounding periods. The sounding periods are coloured light blue, and an analogue red line, a pitch contour, appears in these light blue periods. The breathing periods are white.

These illustrations will also be available as PDF-files in appendix for chapter 8, USB-memorystick)

The y-axis shows the pitch range in hertz (Hz), and the x-axis shows the time in seconds (s).

Next to the picture there will be a very short description of how the improvisation is carried out by the participant.

Then follows the analysis of six parameters, and each analysis is closed with a conclusion and interpretation of the process based on chapter three “Clinical approach as a research method”.

5) This according to Pedersen’s (2000, 2002, 2007) definition and understanding of the three spaces
Figure 73 - left: The pitch contour of AB's Improvisation from the 1. assessment.
In the 1. assessment AB is walking around in the space humming with closed mouth.

Figure 74 - middle: The pitch contour of AB's Improvisation from the 2. assessment.
In the 2. assessment AB is standing with closed eyes humming.

Figure 75 - right: The pitch contour of AB's Improvisation from the 3. assessment.
In the 3. assessment AB is sitting on a chair and singing with open mouth.
8.6.2 AB:
The analysis of the Improvisation

1. Analysis of Parameter 1: Measuring the mean frequency (Hz) / starting pitch of the first tone in voice improvisation.
In the first assessment AB starts the improvisation at 183.30 Hz (F#3). From the first to the second assessment the starting frequency decreases by 28.88 Hz, starting the improvisation at 154.42 Hz, sounding D#3, which is three semitones lower than in the first assessment. From the second to the last assessment the starting frequency increases by 31.57 Hz, starting the improvisation at 185.99 Hz, sounding F#3, which is three semitones higher than in the second assessment. The starting frequency is higher than in the first assessment, but not changing pitch (see table 58).

<table>
<thead>
<tr>
<th>AB</th>
<th>Starting frequency/Hz (Pitch)</th>
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<tbody>
<tr>
<td>1. Assessment</td>
<td>183.30 (F#3)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>154.42 (D#3)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>185.99 (F#3)</td>
</tr>
</tbody>
</table>

Table 58. The fundamental frequency/Hz (Pitch) of AB’s Improvisation

Conclusion and interpretation of the process:
The starting pitch decreases from the first to the second assessment and the process can therefore be described as deteriorating from the first to the second assessment. From the second to the last assessment the starting pitch increases, and ends up being slightly higher in frequency than in the first assessment. Therefore the process can be described as improving from the second to the last assessment. However, the pitch is the same as in the first assessment and can therefore clinically hardly be described as an improvement.

2. Analysis of Parameter 2: Calculating the pitch range of the voice improvisation.
In the first assessment AB’s minimum pitch is 162.96 Hz, sounding E3, and the maximum frequency is 310.74 Hz, sounding D#4 (see figure 73, 1. assessment). The pitch range is 12 semitones.

In the second assessment AB’s minimum pitch decreases by 18.82 Hz, being 144.14 Hz, sounding D3, which is two semitones lower than in the first assessment. The maximum pitch decreases by 124.74 Hz, being 186.00 Hz, sounding F#3, which is 9 semitones lower than in the first assessment (see figure 74, 2. assessment). The pitch range is 5 semitones.

In the last assessment AB’s minimum pitch increases by 25.17 Hz, being 169.31 Hz, sounding E3, which is two semitones higher than in the second assessment. AB’s maximum pitch increases by 123.60 Hz, being 309.60 Hz, sounding D#4, which is 9 semitones higher than in the second assessment (see figure 75, 3. assessment). The pitch range is 12 semitones.

The span of AB’s pitch range in the last assessment is exactly the same size as in the first assessment. The minimum pitch is measured to be 6.35 Hz higher than in the first assessment, and the maximum pitch is measured to be 1.14 Hz lower than in the first assessment. These represent such small differences that there is no difference in pitch between the first and last.

Conclusion and interpretation of the process:
The pitch range in the first assessment spans of 12 semitones, and then decreases by 9 semitones from the first to the second assessment. From the second to the last assessment the pitch range increases by 9 semitones, ending with exactly the same pitch range as in the first assessment. Therefore the process can be described as deteriorating from the first to the second assessment, and then improving from the second to the last assessment. It is important to notice that the pitch range is exactly the same as in the first assessment.
This questions the improvement over time, and suggests that the improvisation should be looked closer at relative to other parameters of the improvisation. The improvisation is one semitone from being evaluated “a wide pitch range” to improvise within (see The Manual for VOIAS-1, appendix 11), which suggests that the conditions for the creativity are basically good.

3. Analysis of Parameter 3: Time based analysis of the improvisation in total.
In the first assessment the duration of the improvisation in total is 52.70 seconds. The improvisation is divided into two parts, one part going from 0 - 26.20 seconds, where the second part then takes its beginning and continue till the end of the improvisation (see figure 73, 1. assessment).

In the second assessment the improvisation decreases by 32.77 seconds from the first to the second assessment, and is therefore shorter than the improvisation from the first assessment (see figure 73 and 74, 1. and 2. assessment). The improvisation is one part, two sounding periods and one breathing period.

From the second to the last assessment the duration of the improvisation in total increases by 56.48 seconds, and represents the longest improvisation of the three assessments (see figure 74 and 75, 2. and 3. assessment).

Conclusion and interpretation of the process:
The duration of the improvisation in total decreases from the first to the second assessment, and therefore the process can be described as deteriorating from the first to the second assessment. The duration of the improvisation in total increases from the second to the last assessment, and even being longer than in the first assessment, and therefore the process can be described as improving both from the second to the last assessment, and over time.

4. Analysis of Parameter 4: Time based analysis of the sounding and breathing duration in improvisation.
In the first assessment the improvisation consists of seven sounding periods, and six breathing periods.

In the first part of the improvisation the sounding durations increase over time, at the same time as the breathing durations decrease over time.

The sounding durations are generally longer than the breathing durations, except for one sounding period, which occur around 4.40 - 5.90 seconds.

In the second part of the improvisation in the first assessment the duration of soundings are all longer than the duration of breathings, and both the duration of breathing and sounding is in the second part of the improvisation finding a pattern of size, which AB sticks to. The duration of soundings vary between 4.76 seconds - 6.43; a difference of 1.67 seconds. The duration of breathing varies between 2.61 seconds and 3.02 seconds; a difference of maximum 0.41 seconds, and in the second part of the improvisation steadily and slightly decreases over time (see figure 73, 1. assessment).

In the second assessment the improvisation consists of two sounding periods, and one breathing period. The sounding durations decrease over time, but longer than the breathing duration (see figure 74, 2. assessment).

In the last assessment the improvisation consists of six sounding periods, and five breathing periods.

The sounding durations increases over time. The breathing durations are generally very long. Except for the last breathing they vary between 4.26 - 8.33 seconds, where the last breathing duration is 2.63 seconds. The breathing durations however generally decrease over time, except for one breathing duration between 49.40 - 54.80 seconds. The first breathing duration is longer than any of the sounding durations, but after this
one, the sounding durations are generally longer than the breathing durations (see figure 75, 3. assessment).

**Conclusion and interpretation of the process:**
In the first part of the improvisation in the first assessment the sounding durations increase over time, at the same time as the breathing durations decrease over time. A natural progress of flow between sounding and breathing is therefore growing in the first part of the improvisation.

The growing flow in the first part of the improvisation indicates that the participant step by step is letting go, allowing her melody to take more and more space, growing slightly in playfullness.

In the second part the breathing and sounding find a pattern, which AB sticks too, and this gives the impression that AB is holding back and taking control over the melody.

In the second assessment the sounding durations decrease over time, and therefore the process can be described as deteriorating from the first to the second assessment.

In the last assessment the sounding durations increase over time, and the breathing durations decrease over time. Therefore the process can be described as improving from the second to the last assessment.

However the breathing durations are quite long, longer than in the first and second assessment, and they are even longer than the sounding durations in this last assessment. The only exception is the last breathing duration in the improvisation around 65.70 - 68.30 seconds in the last assessment. The long breathing durations prohibits AB in the natural progress of flow between the sounding and breathing, and gives the impression that AB is holding back, taking control, instead of allowing a spontaneous expression of the melody to grow.

**5. Analysis of Parameter 5: The visual impression of the pitch contour of the improvisation.**

In the first assessment AB walks around in the space humming with closed mouth. This affects the pitch contour in that it is not a continuous red line, but instead very tiny periods of contours for each humming tone. This makes the pitch contour very uneven to look at.

See figure 73 and listen to soundfile AB-1-Assessment-Improvisation, for chapter 8, USB-memorystick)

In the second assessment AB stands with closed eyes humming. Just like in the first assessment the humming affects the pitch contour, making it uneven.

See figure 74 and listen to soundfile AB-2-Assessment-Improvisation, for chapter 8, USB-memorystick)

In the last assessment AB sits on a chair singing with open mouth. This makes the contour a continuous red line, where one tone is sliding into the next.

See figure 75 and listen to soundfile AB-3-Assessment-Improvisation, for chapter 8, USB-memorystick)

**Conclusion and interpretation of the process:**
The pitch contour becomes more clear and continuous over time, and AB is going from humming with closed mouth (A “private space”) to singing with open mouth and allowing her sound into a “social space” a so-called “Field of play”. The pitch contour makes it visible that AB from the second to the last assessment is in a process where she allows her sound to appear more in the “social space” and the Field of play, where the meeting and the interaction with the music therapist takes place more actively.

Therefore the process can be described as improving over time.
Chapter 8

Figure 76: The formant contours of AB's Improvisation from the 1. assessment.
In the first assessment AB is walking around in the space humming with closed mouth.

Figure 77: The formant contours of AB's Improvisation from the 2. assessment.
In the second assessment AB is standing with closed eyes humming.

Figure 78: The formant contours of AB's Improvisation from the 3. assessment.
In the last assessment AB is sitting on a chair and singing with open mouth.

Introduction to the analysis of parameter six. First an illustration will show formant contours of the improvisation in its full length. The illustration of the formant contours shows the improvisation in its full duration, divided into breathing and sounding periods. The sounding periods are coloured light blue, and the formant contours appear as red speckles. To support the experience of the sounding period, the pitch contour in this illustration appears as an analogue grey line. The breathing periods are white.

To the left of the y-axis the pitch range of the formant contours is shown in hertz (Hz), and to the right of the y-axis the pitch range of the pitch contour is shown in hertz (Hz). The x-axis shows the time in seconds (s.). Below the picture the short description of how the improvisation is carried out by the participant will be repeated. These illustrations will also be available as PDF-files in appendix for chapter 8, USB-memorystick.

Then follows the analysis and each analysis is closed with a conclusion and interpretation of the process based on chapter 4 “Clinical approach as a research method”.

In the first assessment five formant contours are visible. But taking a closer look at the breathing periods it is noticeable that the four upper formant contours are not only present in the sounding periods, but also in the breathing periods. In addition there are a lot of red speckles between the four upper formant contours. See figure 76, 1. assessment or see appendix for chapter 8, USB-memorystick.

Having in mind that AB is walking around in the space this might be the explanation why there is five clear formant contours. The first formant contour however follows to the pitch contour, and is only present in the sounding periods. See figure 76, 1. assessment or see appendix for chapter 8, USB-memorystick.

In the second assessment four formant contours are visible. Especially the first and the second formant contour are clear. The third and fourth formant contours are unclear, and there is a lot of space between the red speckles. The second however is also present in the breathing periods, but not in the same intensity. There are a lot of red speckles between the formant contours from the second formant contour. The first formant contour follows the pitch contour. See figure 77, 2. assessment or see appendix for chapter 8, USB-memorystick.

In the last assessment there are four formant contours present. They all follow the pitch contour, and therefore only present in the sounding periods. Over time there fewer red speckles between the different formant contours, and the formant contours are thinner and more concentrated than in the first and second assessment. See figure 78, 3. assessment or see appendix for chapter 8, USB-memorystick.

Conclusion and interpretation of the process:

It is hard to say if there is any difference between the first and the second assessment, because the formant contours are affected by the sounds of walking around in the space in the first assessment. But it is only the first formant contour which follows the pitch contour. This question if the conditions for recording, which in this case, where the client is singing very low and with closed mouth clearly affect the calculation of the formant contours, and therefore also makes the analysis difficult in the first and second assessment.

In the last assessment all the formant contours follow the pitch contour, and they are more concentrated - thinner, and there are hardly any red speckles between the formant contours. Therefore the process can be described as improving from the second to the last assessment, and also from the first to the last assessment.
Summary and interpretation of the process as a whole:
Table 59 gives an overview of the conclusions and interpretations of the process according to the six parameters of the Improvisation. The process can be described as improving in one parameter out of six parameters, and four parameters out of six can be described as deteriorating from the first to the second assessment. Parameter six is difficult to evaluate.
From the second to the last assessment the process can be described as improving in all parameters.
From the first to the last assessment the process can be described as improving in all parameters. However, the starting pitch and the pitch range is the same as in the first assessment, and can therefore clinically hardly be described as an improving process over time.

Clinically this leads me to consider that AB’s depression is decreasing over time. Studying the psychoacoustic process more closely, it is evident that the improvement especially happens between the second and the last assessment. The fact that four parameters is deteriorating from the first to the second assessment indicates that the clinical process is deteriorating, and the client actually is worse than when starting the therapy. There is equivalence in the description of the process when relating this to the description of the therapeutic process in chapter 8.2. It is here described that there was a pause in the treatment between the sixth and seventh session for two and a half months. The second assessment was carried out in the seventh session.

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<tr>
<td>2. Assessment</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>0</td>
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<tr>
<td>3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>+</td>
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</tr>
</tbody>
</table>
| 1. - 3. Assessment | + (0) | + (0) | + | + | + 

Table 59: The process of AB’s Improvisation. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
The analyses of the three other participants are presented in the same format as used above, and therefore the method and rationale for each parameter is not repeated for each participant.
Chapter 8

Figure 79: The pitch contour of BC’s Improvisation from the 1. assessment. In the first assessment BC is walking around in the space singing with open mouth.

Figure 80: The pitch contour of BC’s Improvisation from the 2. assessment. In the second assessment BC is walking around in the space singing with open mouth.

Figure 81: The pitch contour of BC’s Improvisation from the 3. assessment. In the last assessment BC is walking around in the space singing with open mouth.
8.6.3 BC:
The analysis of the Improvisation

1. Analysis of Parameter 1: Measuring the mean frequency (Hz) / starting pitch of the first tone in voice improvisation.

In the first assessment the starting frequency is 178.68 Hz, sounding F3.
From the first to the second assessment the starting pitch decreases by 1.77 Hz to 176.91 Hz, and sounding F3.
From the second to the last assessment the starting frequency decreases by 5.02 Hz to 171.89 Hz, and sounding F3 (see table 60).

<table>
<thead>
<tr>
<th>BC</th>
<th>Starting frequency/Hz (Pitch)</th>
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<tbody>
<tr>
<td>1. Assessment</td>
<td>178.68 (F3)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>176.91 (F3)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>171.89 (F3)</td>
</tr>
</tbody>
</table>

Table 60. The fundamental frequency/Hz (Pitch) of BC’s Improvisation

Conclusion and interpretation of the process:
BC is starting all three improvisations at the same pitch though she decreases slightly in frequency over time.
As mentioned in the premier analysis it is important to bear in mind that the conditions for starting the improvisation are very different from the previous exercises (see chapter 6.6 describing the protocol for assessing). This can affect the starting frequency, and therefore I find it hard to make reliable conclusions or interpretations of the process in the same way as in the exercises above.

2. Analysis of Parameter 2: Calculating the pitch range of the voice improvisation.

In the first assessment BC’s minimum pitch is 160.04 Hz, reaching the maximum pitch at 283.19 (see figure 79, 1. assessment). The pitch range is 10 semitones.

In the second assessment BC’s minimum pitch decreases by 9.49 Hz, which is two semitones lower than in the first assessment. The maximum pitch increases by 59.82 Hz, which is four semitones higher than in the first assessment (see figure 80, 2. assessment). The pitch range is 16 semitones.

In the last assessment BC’s minimum pitch increases by 1.51 Hz, one semitone higher than in the second assessment. The maximum pitch increases by 118.92 Hz, five semitones higher than in the second assessment (see figure 81, 3. assessment). The pitch range is 20 semitones.

Conclusion and interpretation of the process:
The pitch range increases steadily over time. From the first to the second assessment the pitch range increases by six semitones, and from the second to the last assessment the pitch range increases a further four semitones. Therefore the process can be described as generally improving over time. According to the guidelines for VOIAS-1 BC’s pitch range can be evaluated as a “wide - expanded or extended”, which suggests that the conditions for the creativity are basically good.

3. Analysis of Parameter 3: Time based analysis of the improvisation in total.

In the first assessment the duration of the improvisation in total is 9.85 seconds (see figure 79, 1. assessment).

In the second assessment the duration of the improvisation in total is 12.99 seconds, increasing by 3.14 seconds from the first to the second assessment (see figure 80, 2. assessment).

In the last assessment the duration of the improvisation in total is 101.90 seconds, increasing by 88.91 seconds from the second to the last assessment (see figure 81, 3. assessment).

Conclusion and interpretation of the process:
The improvisation steadily increases over time, especially from the second to the last...
Chapter 8

assessment. Therefore it can be concluded that BC in the last assessment clearly is allowing her improvisation to take space, and the process can be described as improving over time.

4. Analysis of Parameter 4: Time based analysis of the sounding and breathing duration in improvisation.
The first assessment is divided into two sounding periods and one breathing period. The breathing duration is below one second, and the first sounding duration is slightly larger than the second sounding duration (see figure 79, 1. assessment).

The second assessment is divided into two sounding periods and one breathing period. The breathing duration decreases from the first to the second assessment, and the sounding duration increases slightly from the first to the second (see figure 80, 2. assessment).

The last assessment is divided into 13 sounding periods and 12 breathing periods. Visually only two places are eye-catching, namely where the breathing durations clearly is larger than the rest, with the breathing duration around 24.30 - 25.10 seconds, and around 88.80 - 89.40 seconds. However the breathing durations are generally very short; all below one second. The breathing duration until 24.30 decreases over time, and the same thing happens over a longer period from 25.10 - 33.20 seconds (see figure 81, 3. assessment).

Conclusion and interpretation of the process:
All breathing durations are below one second, and as such supporting the flow in the sounding periods. This especially happens in the last assessment, where the improvisation is so long. Therefore the process can be described as improving over time.

5. Analysis of Parameter 5: The visual impression of the pitch contour of the improvisation.
In the two first assessments BC stands still while singing, but in the last assessment BC walks around in the space while singing. In all three improvisations BC sings with open mouth which makes the pitch contour a continuous red line, where one tone is sliding into the next. It therefore appears very clear and easy to follow in the movement of the melody in all three assessments.

In the first assessment BC stands still and sings with open mouth, and the pitch contour appears as a continuous red line, where one tone is sliding into the next. See figure 79, 1. assessment or see appendix for chapter 8, USB-memorystick).

In the second assessment BC is also standing still and singing with open mouth, which again makes the pitch contour appear as a continuous red line, where one tone is sliding into the next. See figure 80, 2. assessment or see appendix for chapter 8, USB-memorystick).

In the last assessment BC
See figure 81, 3. assessment or see appendix for chapter 8, USB-memorystick).

Conclusion and interpretation of the process:
In this case the process can neither be described as improving nor deteriorating, because the quality of the pitch contour seems clear and continuous from the start. From a clinical perspective it is however an important observation that BC does not hold back her expression, but has the will and resources to allow her melody to be heard even in the first assessment.

In the first assessment it is possible to see four formant contours. However there is a lot of space between the red speckles in the formants contours, and therefore they appear “breathy”. This applies even for the first formant contour. There is no clear difference between the formant contours in the first and second sounding periods See figure 82, 1. assessment or see appendix for chapter 8, USB-memorystick).

In the second assessment it is possible to see four formant contours. However there is a lot
Figure 82: The formant contours of BC’s Improvisation from the 1. assessment. In the first assessment BC is walking around in the space singing with open mouth.

Figure 83: The formant contours of BC’s Improvisation from the 2. assessment. In the second assessment BC is walking around in the space singing with open mouth.

Figure 84: The formant contours of BC’s Improvisation from the 3. assessment. In the last assessment BC is walking around in the space singing with open mouth.
of space between the red speckles in the formant contours in the first sounding period, and therefore they appear “breathy”. In the second sounding period the red speckles gather more. From around 6.10 - 10.50 seconds especially the first two formant contours grow clearer in formant contours, and from around 10.50 - 12.99 four formant contours appear quite clear, with hardly any red speckles between the formant contours. In this period BC sings the last note, sounding the vowel “Ah-h-h”.

See figure 83, 2. assessment or see appendix for chapter 8, USB-memorystick).

In the last assessment from around 0 - 15 seconds it is possible to see two formant contours. However there is some space between the red speckles, which makes each formant contour appear wide and breathy. See figure 84, 3. assessment or see appendix for chapter 8, USB-memorystick).

From around 15 - 30 seconds, the formant contours becomes more and more clear, and the red speckles are gathering, and less and less red speckles appear between the formant contours over time.

From around 25 - 30 seconds it is possible to see five formant contours, and BC is singing the vowel “Ah-h-h” around the pitch G#3.

From around 30 - 53 seconds the formant contours become a bit more unclear again, and red speckles appear between the formant contours.

From around 53 - 56 seconds BC clearly change vowel, and she sings “Ae-e-e” which appears in four clear formant contours, with hardly any red speckles between the formant contours.

From around 56 - 80 seconds BC moves up the scale, and goes from modal register to falsetto register (see chapter 4.6.2), and the formant contours get more and more unclear, fewer and fewer, and at around 75 - 80 seconds the first formant contour is mainly present.

From around 80 - 97 seconds BC moves down the scale again, and five formant contours appear clearly, with hardly any red speckles between the formant contours.

From around 80 - 85.70 seconds BC sings in her high register on the vowel “Uu-u”, and from around 85.70 BC changes register and sing in her full register again and changes the vowel into “Ah-h-h”, which keeps the formant contours pretty clear, without hardly any red speckles between the formant contours.

Around 95 seconds BC changes vowel again and comes to a close on the vowel “Ah-h-h” See figure 84, 3. assessment or see appendix for chapter 8, USB-memorystick).

Conclusion and interpretation of the process:
The formant contours become more and more clear over time. It is visible that the high notes are not as clear as the notes in BC’s full register. It is also very clearly visible that in the last improvisation BC is playing with different vowels / sounds, allowing herself to play with her voice.

So all in all the last improvisation appears very playful and rich, and it can be concluded that the improvisation supports BC in gaining more life into her sounds, and that the creativity is growing over time. Therefore the process can be described as improving over time, and especially from the second to the last assessment.
Summary and interpretation of the process as a whole:
Table 61 gives an overview of the conclusions and interpretations of the process according to the six parameters of the Improvisation.

The process can be described as improving in five parameters out of six parameters. In one parameter out of six, the fundamental frequency, the process can be described as deteriorating from the first to the second assessment. BC is starting on the same pitch in all three assessments. From the first to the last assessment the pattern of the process is the same and can be described as improving in all parameters, except for the fundamental frequency.

As mentioned in the introduction to BC, she is an experienced vocalist, and the fact that she knows the exercises very well from her own training it seems she easily finds her way back in this working method. The improvisation is a very supportive element for BC and her recovery. This leads me to consider that this exercise supports BC to engage, grow and expand into the “field of play” (see chapter 4.4) in the movement towards wholeness. Relating the conclusion of the process of the improvisation with BC’s music therapy process described in the chapter 8.2, the processes follow the same patterns.

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<td>+</td>
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<td>+</td>
</tr>
<tr>
<td>3. Assessment</td>
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<td>+</td>
<td>+</td>
<td>+</td>
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<td>- (0)</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 61: The process of BC’s Improvisation. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).
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8.6.4 DC  
The analysis of the Improvisation

In the first and second assessment DC spontaneously happened to sing a song instead of improvising. Therefore there is no analysis of the first and second assessments. Because the last assessment is the only assessment where DC was able to perform the task of an improvisation a conclusion and interpretation of the process are not possible in all the parameters. However in some parameters there will be an interpretation.

1. Analysis of Parameter 1: Measuring the mean frequency (Hz) / starting pitch of the first tone in voice improvisation. The starting frequency is 69.49 Hz, sounding C#2. The ending frequency is 77.72 Hz, sounding D#2 (see figure 85, 3. assessment).

2. Analysis of Parameter 2: Calculating the pitch range of the voice improvisation. In the last assessment DC improvises and makes up his own melody. The minimum pitch in the improvisation is 54.86 Hz, sounding the pitch A1, and the maximum frequency is 141.86 Hz, sounding the pitch C#3 (see figure 85, 3. assessment). The pitch range spans of 17 semitones.

Conclusion and interpretation of the process: The pitch range within the improvisation is wide (see The Manual for VOIAS-1, appendix 11), which suggests that the conditions for the creativity basically are very good.

3. Analysis of Parameter 3: Time based analysis of the improvisation in total. In the last assessment the duration of DC’s improvisation is 18.11 seconds (see figure 85, 3. assessment).

Figure 85: The pitch contour of DC’s Improvisation from the 3. assessment.
Conclusion and interpretation of the process:
The improvisation seems short, and DC has had some difficulties in approaching this exercise and engage into the “Field of play” (see chapter 4.4). Therefore it in a clinical situation would raise some considerations, which should be examined further.

4. Analysis of Parameter 4: Time based analysis of the sounding and breathing duration in improvisation.
The improvisation in the last assessment consists of four sounding periods and three breathing periods (see figure 85, 3. assessment).
The breathing durations are all below one second.
The sounding period from 0 - 5 seconds is the longest.

Conclusion and interpretation of the process:
The breathing durations are short, which support flow in a spontaneous sounding and creation of a melody, which is good.

5. Analysis of Parameter 5: The visual impression of the pitch contour of the improvisation.
DC walks around in the space singing short words, and he hardly opens his mouth. Because DC hardly opens his mouth the pitch contour is uneven to look at. See figure 85 and listen to soundfile DC-3-Assessment-Improvisation for chapter 8, USB-memorystick).

Conclusion and interpretation of the process:
Because the pitch contour is uneven caused by not opening his mouth it is my clinical consideration that DC has difficulties in allowing his melody to enter the “Social space and engage into the “Field of play” (see chapter 4.4).

There are five formant contours visible, but there is a lot of space between the red speckles, and red speckles also appear between the formant contours. From around 5.60 - 18.11 seconds the first formant contour expands in clearness over time (see figure 86, 3. assessment).

Conclusion and interpretation of the process:
The formant contours could be better and appear clearer.
Figure 87: The pitch contour of BD’s Improvisation from the 1. assessment. In the first assessment BD is walking around in the space humming with closed mouth.

Figure 88: The pitch contour of BD’s Improvisation from the 2. assessment. In the second assessment BD is walking around in the space humming sometimes with open mouth, sometimes with closed mouth.

Figure 89: The pitch contour of BD’s Improvisation from the 3. assessment. In the last assessment BD is walking around in the space singing a tiny little melody - an ostinato - repeating it five times. BD is singing with open mouth. The tone of the little melody is not always in tune.
8.6.5 BD
The analysis of the Improvisation

BD's improvisation from the second assessment has been very difficult to analyse. Partly it is because of the way BD is singing. He sings very short sounds, and sometimes he even whispers. It is like he is using the last breath to sound wispering short notes before breathing in. These short whispering sounds are not registered by Praat. Therefore the pauses in this improvisation do not always start when the red pitch contour line is finished.

His walking around in the space makes it even more complicated. So the sounds of his or my feet are sometimes registred by PRAAT, and appear like artifacts, which disturb the visual impression of the pitch contour. Therefore I have decided to remove the very large artifacts from the illustration part of this study.

The way I have ensured that it is an artifact is by zooming in on the pitch contour in the Praat program, and listen to the sound file, looking at the movement of the pitch contour while listening to the sound file, following the steps of notes sounded.

The analysis of BD's improvisation has been very difficult to analyse. Partly it is because of the way BD is singing. He sings very short sounds, and sometimes he even whispers. It is like he is using the last breath to sound wispering short notes before breathing in. These short whispering sounds are not registered by Praat. Therefore the pauses in this improvisation do not always start when the red pitch contour line is finished.

His walking around in the space makes it even more complicated. So the sounds of his or my feet are sometimes registered by PRAAT, and appear like artifacts, which disturb the visual impression of the pitch contour. Therefore I have decided to remove the very large artifacts from the illustration part of this study.

The way I have ensured that it is an artifact is by zooming in on the pitch contour in the Praat program, and listen to the sound file, looking at the movement of the pitch contour while listening to the sound file, following the steps of notes sounded.

1. Analysis of Parameter 1: Measuring the mean frequency (Hz) / starting pitch of the first tone in voice improvisation.

In the first assessment the starting frequency is 136.62 Hz, sounding C#3. From the first to the second assessment the starting frequency increases by 14.79 Hz, sounding D#3, which is two semitones higher than in the first assessment.

From the second to the last assessment the starting pitch decreases by 42.78 Hz, sounding A2, which is six semitones lower than in the second assessment (see table 63).

<table>
<thead>
<tr>
<th>BD</th>
<th>Starting frequency/Hz (Pitch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>136.62 (C#3)</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>151.41 (D#3)</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>108.63 (A2)</td>
</tr>
</tbody>
</table>

Table 63. The fundamental frequency/Hz (Pitch) of BD’s Improvisation

Conclusion and interpretation of the process:
The starting frequency increases from the first to the second assessment, and then decreases from the second to the last assessment, ending even lower than in the first assessment.

Bearing in mind that the conditions for starting the voice improvisation are very different from the other exercises it is difficult to come to any conclusion or make any interpretation of the process. The complexity of the exercise can have many affects on how the improvisation is carried out.

2. Analysis of Parameter 2: Calculating the pitch range of the voice improvisation.

In the first assessment BD’s minimum frequency is 79.35 Hz (D#2), and BD’s maximum frequency is 159.19 (D#3) (see figure 87, 1. assessment). The pitch range is 13 semitones, an octave.

In the second assessment BD’s minimum frequency increases by 17.22 Hz, sounding 96.57 Hz (G2), which is four semitones higher than in the first assessment. BD’s maximum frequency increases by 37.35 Hz, sounding 196.54 Hz (G3), which is four semitones higher than in the first assessment (see figure 88, 2. assessment). The pitch range is 13 semitones, an octave.

In the last assessment BD’s minimum frequency decreases by 4.62 Hz, sounding 91.95 Hz (F#2), which is one semitone lower than in the second assessment, and BD’s maximum frequency decreases by 40.88 Hz, sounding 155.66 Hz (D#3), which is four semitones lower than in the second assessment (see figure 89, 3. assessment). The pitch range is 10 semitones.
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Conclusion and interpretation of the process:
The pitch range is the same in the first and second assessment.
In the last assessment the pitch range decreases three semitones. Therefore the process can be described as deteriorating over time.
According to the guidelines for VOIAS-1 BD’s pitch range can be evaluated as a “wide - expanded or extended” in the first and second assessment, but minimizing in the last assessment, which suggests that the conditions for the creativity are limited. This suggests that the conditions for daring to explore possibilities or opportunities of the “living space” in the “sounding space” are challenged (see chapter 4.4).

3. Analysis of Parameter 3: Time based analysis of the improvisation in total.
In the first assessment the duration of the improvisation in total is 20.52 seconds (see figure 87, 1. assessment).
In the second assessment the duration of the improvisation in total is 46.90 seconds, increasing by 26.38 seconds from the first to the second assessment (see figure 88, 2. assessment).
In the last assessment the duration of the improvisation in total is 55.18 seconds, and increases by 8.28 seconds from the second to the last assessment (see figure 89, 3. assessment).

Conclusion and interpretation of the process:
The improvisation steadily increases over time. Therefore the process can be described as improving over time.

4. Analysis of Parameter 4: Time based analysis of the sounding and breathing duration in improvisation.
In the first assessment the improvisation consists of seven sounding periods, and six breathing periods (see figure 88, 2. assessment).
The sounding durations increase steadily over time, except for one sounding period around 17.20 - 21.10 seconds. The breathing durations are all under two seconds, except for the third breathing duration around 14.10 - 17.10 seconds. However there is no pattern for increasing or decreasing in duration. The breathing duration appears random.
In the last assessment the improvisation consists of nine sounding periods, and eight breathing periods (see figure 89, 3. assessment).
The breathing takes place regularly, structured by the little melody - the ostinato BD is singing. Every time BD has sounded a phrase of the little melody, he takes a breath, and then sounds the following phrase. Until around 33.40 seconds both the breathing and sounding durations vary randomly in size, but within small differences. However from around 33.40 - 55.18 seconds the breathing and sounding durations taking place follow a pattern where neither the size of the breathing nor the size of the sounding changes radically.

Conclusion and interpretation of the process:
Both in the first and the second assessment BD’s sounding durations increase steadily over time in the improvisations. The breathing durations in the first assessment also increase slightly over time in the improvisation, but the breathing durations are never larger than two seconds. The breathing durations in the improvisation in the second assessment can be described in the same way. However the third breathing duration is the only one longer than two seconds.
In the last assessment however the breathing and sounding durations are controlled by the little melody - the ostinato, and the sounding and breathing periods find a pattern, and BD sticks to this pattern from around 33.40 seconds and in the rest of the improvisation. Therefore the process of sounding can be described as restricted or rigid, when considering the purpose of the vocal improvisation.
Figure 90: The formant contours of BD’s Improvisation from the 1. assessment. In the first assessment BD is walking around in the space humming with closed mouth.

Figure 91: The formant contours of BD’s Improvisation from the 2. assessment. In the second assessment BD is walking around in the space humming sometimes with open mouth, sometimes with closed mouth.

Figure 92: The formant contours of BD’s Improvisation from the 3. assessment. In the last assessment BD is walking around in the space singing a tiny little melody - an ostinato - repeating it five times. BD is singing with open mouth. The tone of the little melody is not always in tune.
5. Analysis of Parameter 5: The visual impression of the pitch contour of the improvisation.
In the first assessment the pitch contour is affected by BD walking around in the space humming very small staccato sounds with closed mouth. This makes the pitch contour appear uneven.
See figure 87, 1. assessment or see appendix for chapter 8, USB-memorystick).

In the second assessment the pitch contour is still affected by BD walking around in the space humming very small staccato sounds with closed mouth, sometimes singing very small staccato sounds with open mouth. Therefore the pitch contour appears uneven, and is not a continous red line.
See figure 88, 2. assessment or see appendix for chapter 8, USB-memorystick).

In the last assessment BD still walks around in the space, but the pitch contour appears as a continous red line in this assessment, where BD is sounding a little melody - an ostinato - running over two sounding periods, and one breathing period.
See figure 89, 3. assessment or see appendix for chapter 8, USB-memorystick).

Conclusion and interpretation of the process:
The pitch contour becomes clearer and even over time, because BD is opening his mouth more and allowing his melody more to enter the “Social space” and engage in the “field of play” (see chapter 4.4). Therefore the process can be described as improving over time.

Taking a quick overall view of the three contours from the three assessments, it is as if the form and structure of the little melody are becoming more and more clear over time, and in the last assessment finding its form and structure, which gives me the association that BD in a way is becoming more and more visible as a person.

In the first assessment there is hardly any difference between the sounding and the breathing periods in the formant contours. Five visible formant contours appear. Between the five formant contours some red speckles appear, and in the different formant contours there is a lot of space between the red speckles.
See figure 90, 1. assessment or see appendix for chapter 8, USB-memorystick).

In the second assessment the first formant contour appears slightly clearer, because the red speckles have gathered a bit and follows the pitch contour. The second formant contour is also slightly clearer, but only so much that it is possible to see a difference between the sounding and breathing periods. The three other formant contours appear unclear and there is a lot of space between the red speckles.
See figure 91, 2. assessment or see appendix for chapter 8, USB-memorystick).

In the last assessment there is a more clear difference between the breathing and sounding periods, but there is still a lot of space between the red speckles. The first formant contour clearer in the last assessment than in the first and second assessments.
See figure 92, 3. assessment or see appendix for chapter 8, USB-memorystick).

Conclusion and interpretation of the process:
The formant contour is highly affected by BD walking around in the space. However it is visible that the formant contour becomes clearer over time in the first formant contour. Therefore the process can be described as improving over time.
### Summary and interpretation of the process as a whole:

Table 64 gives an overview of the conclusions and interpretations of the process according to the six parameters of the Improvisation.

The process can be described as improving in four parameters out of six parameters from the first assessment to the second assessment. In two parameters, the pitch range and the duration, the process can neither be described as deteriorating nor improving from the first to the second assessment. From the second to the last assessment the process can be described as improving in three out of six parameters, and deteriorating in three out of six. From the first to the last assessment the pattern of the process is the same.

For BD to perform the vocal improvisation it was necessary to walk around in the room. In this way it was possible for him to start humming. Clinically this is important to allow, and is definitely the first step in allowing his own melody to enter the room. But in the first assessment it was very much kept to himself.

The visual impression of the pitch contour of the improvisation revealed that the form and structure of the little melody are becoming more and more clear over time, and in the last assessment the melody becomes visible in form and structure, which gives me the association that BD in a way is becoming more and more visible as a person.

At the same time BD’s pitch range is decreasing from the second to the last assessment, and is decreasing from the first to the last assessment and limiting the living space, as if the person has a need for withdrawing. This suggests that the conditions for daring to explore possibilities or opportunities of the “living space” in the “sounding space” has been challenged (see chapter 4.4). The limitation of the “living space” could then be interpreted as a need for BD to feel safe.

Relating this interpretation to the time analysis of the improvisation in total, which are increasing, makes me wonder if that prolonging of the duration of the improvisation in total not necessarily in this case can be interpreted as improving. This is supported by the fact that by studying the pitch contour it is evident that the melody finds a pattern, and that this pattern is repeated. In the last assessment the breathing and sounding durations are controlled by the little melody - the ostinato, and the sounding and breathing periods also find a pattern, which BD sticks to from around 33.40 seconds and in the rest of the improvisation. Therefore the process of sounding concludingly can be described as restricted or rigid, when considering the purpose of the vocal improvisation.

The interpretation makes sense when related to the introduction of BD where it is clarified that when the depression becomes mild, another diagnosis, autism, is revealed.

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Table 64: The process of BD’s Improvisation. Improving (+), Deteriorating (-). Neither improving nor deteriorating (0).
8.7 Studying the pattern of the process across the exercises and in relation to the statistical results of the employment of VOIAS-1

Introduction
The following tables are summaries giving an overview of the process as a whole, across the exercises for each participant. The focus is on indicating whether the process is improving (+) or deteriorating (-) from the first to the second assessment, and from the second to the last assessment. The last assessment will be compared with the starting point for the process, the first assessment, thus evaluating if the process is either improving or deteriorating as a whole.

The conclusion and interpretation of this analysis will be related to the client’s process in clinical practice, as described in the presentation of each client in chapter 8.2. The conclusion and interpretation of this analysis will show if there are any patterns, differences or similarities between participants, and it will clarify the limitations and potentials of the assessment profile. It will further give some directions according to future work in the development of a voice assessment profile as a whole.

Guidelines for reading the tables
In the first column the client initials and the number of the assessment are presented. In the following columns follow the number and the name of the parameter evaluated as well as the measurements.

The first row is always marked with a zero. In the second row the process from the first to the second assessment is evaluated as either improving (+) or deteriorating (-), and so forth.

In the last row the first assessment is related to the last assessment. If the process does not move this is marked by a zero. Sometimes the calculation of pitch indicates a process, but pitch does not change. The process is then evaluated as either improving (+) or deteriorating (-). However, if pitch does not change this is given in brackets with a zero.

8.7.1 The pattern of AB’s process across the exercises

The Glissando:
Table 65 gives an overview of the conclusion and interpretation of the process according to the four parameters of the glissando.

<table>
<thead>
<tr>
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<th>3. Ending pitch vs. Max asc.</th>
<th>4. Time based analysis</th>
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<td>2. Assessment</td>
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<td>0</td>
<td>0</td>
<td>-</td>
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<td>3. Assessment</td>
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<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>1. - 3. Assessment</td>
<td>0</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 65: AB The Glissando - Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

From the first to the second assessment AB’s process can neither be described as improving nor deteriorating in three out of four parameters. In the fourth parameter the process can be
described as deteriorating from the first to the second assessment. From the second to the last assessment the process can be described as improving in three out of four parameters. In the first parameter the process can neither be described as improving nor deteriorating. The process from the first to the last assessment can be described in the same way as the process from the second to the last assessment.

*The CoreTone:*
Table 66 gives an overview of the conclusions and interpretations of the process according to the six parameters of the CoreTone.

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<td>+</td>
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<tr>
<td>3. Assessment</td>
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<tr>
<td>1 - 3. Assessment</td>
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<td>+</td>
<td>+</td>
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</tbody>
</table>

Table 66: The process of AB's CoreTone over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

From the first to the second assessment only three parameters out of six were possible to measure and analyse.

The process can be described as improving in two out of three possible parameters, the first and the second parameter, from the first to the second assessment. In the third parameter the process can be described as deteriorating from the first to the second assessment. From the second to the last assessment the process can be described as improving in all parameters.

*The CoreToneVolume:*
Table 67 gives an overview of the conclusion and interpretation of the process according to the five parameters of the CoreToneVolume.

AB's process can be described as improving in four out of five parameters from the first to the second assessment, and deteriorating in one parameter. However, parameter 4 can hardly be described as improving. From the second to the last assessment the process can be described as improving in all parameters. From the first assessment to the last assessment the process can be described as improving in all parameters, and therefore also over time. The pattern of the CoreToneVolume follows the same pattern as the CoreTone from the second to the last assessment, and the first assessment to the last assessment.

*The Song:*
Table 68 gives an overview of the conclusion and interpretation of the process according to the five parameters of the Song.
From the first to the second assessment data is missing. AB’s process can be described as

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<td>1. - 3. Assessment</td>
<td>+ (0)</td>
<td>+ (0)</td>
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<td>+</td>
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</tbody>
</table>

Table 68: The process of AB’s Song over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

improving in three out of four parameters from the second to the last assessment. In parameter two the process is deteriorating. The pattern of the spectral centroid does not follow the pattern of the CoreTone and CoreToneVolume from the second to the last assessment, and from the first assessment to the last assessment.

The Improvisation:
Table 69 gives an overview of the conclusions and interpretations of the process according to the six parameters of the Improvisation.

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<td>0</td>
<td>0</td>
<td>0</td>
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<td>2. Assessment</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>+ (0)</td>
<td>+</td>
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<td>+</td>
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</tbody>
</table>

Table 69: The process of AB’s Improvisation. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

The process can be described as improving in one parameter out of six parameters, and four parameters out of six can be described as deteriorating from the first to the second assessment. Parameter six is difficult to evaluate. From the second to the last assessment the process can be described as improving in all parameters. From the first to the last assessment the process can be described as improving in all parameters. However, the starting pitch and the pitch range are the same as in the first assessment, and can therefore clinically hardly be described as an improving process over time.

Conclusion and interpretation
Seven parameters were missing(6) and this leaves 18 parameters possible to evaluate from the first to the second assessment (see CoreTone and Song).
The process from the first to the second assessment is described as improving in 5 out of 25 parameters. In 7 out of 18 parameters the process is described as deteriorating. In 6 out of 18 parameters the process is not moving, which clinically may be viewed as deteriorating. Clinically the process therefore can be described as deteriorating in 11 out of 18 parameters. The process reported in clinical practice is described as improving until the 6. session. Then

(6) In the first assessment I forgot to have AB sing the CoreTone once alone and sing the song.
there is a pause in the music therapeutic treatment for 2 ½ months. AB is invited to a verbal follow-up session, and then in the following session, the seventh the second assessment is carried out. In this session it is revealed that AB’s state of being has deteriorated during the pause of the music therapy treatment, and AB experiences her state of being even worse than in the first session. The clinical process is then described as deteriorating, which is identical with what most assessments describe.

Looking into detail which exercises describe the process as deteriorating from the first to the second assessment it is revealed that it is the Glissando exercise and the Improvisation which are clearly similar in this description. These two exercises differ from the three others in that some of the parameters are quite different from the two other exercises. This finding indicates that it can be important to have a voice assessment consisting of at least three different types of exercises, because they together offer a broader description of the person being assessed. As mentioned in the development of VOIAS-1 I imagined that each exercise could stand alone, but this finding addresses the importance of a voice assessment comprised of at least three vocal exercises, the Glissando, the CoreTone and the Improvisation (see chapter 6.6).

The process from the second to the last assessment is described as improving in 23 out of 25 parameters. In one parameter in the Song-exercise the process is described as deteriorating, and one parameter in the Glissando-exercise is neither improving nor deteriorating. Therefore it can be concluded that there is equivalence in the description of the process of the assessment across the exercises from the second to the last assessment.

The process from the first to the last assessment is described as improving in 21 out of 25 parameters. In one parameter in the Song-exercise the process is described as deteriorating, and in 3 out of 25 parameters the process is not moving, which may be viewed as deteriorating. Clinically, the process therefore can be described as deteriorating in 4 out of 25 parameters. Thus, it can be concluded that there is equivalence in the assessment across the exercises in describing the process from the first to the last assessment as improving.

The final result from the last assessment follows the same pattern as the process reported in clinical practice. It can also be concluded that the process of improvement occurs mainly in the period from the second to the last assessment.

Comparing the psychoacoustic results with the statistical results of the process there is equivalence in the description of the process of the assessment across the exercises from the second to the last assessment (see table 70). The conclusion of the statistical analysis indicated that three independent music therapists and I measured AB’s therapeutic process to improve significantly from the second assessment to the last assessment.

<table>
<thead>
<tr>
<th>1. assessment</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. assessment</td>
<td>-</td>
</tr>
<tr>
<td>3. assessment</td>
<td>+ significant</td>
</tr>
<tr>
<td>1. assessment - 3. assessment</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 70: AB Improving (+), Deteriorating (-), Neither improving nor deteriorating (0)
8.7.2 The pattern of BC’s process across the exercises

**The Glissando:**
Table 71 gives an overview of the conclusion and interpretation of the process according to the four parameters of the glissando.

The process can be described as improving in all parameters from the first to the second assessment, and as deteriorating from the second to the last assessment. The process from the first assessment to the last assessment can be described as improving, and therefore it can be concluded that BC is able to maintain the achieved improvement.

**The CoreTone:**
Table 72 gives an overview of the conclusions and interpretations of the process according to the six parameters of the CoreTone.

The process can be described as improving in all six parameters from the first to the second assessment. From the second to the last assessment the process can be described as deteriorating in the fourth and sixth parameter, but improving in the rest of the parameters. Compared to the first session, the last session can be described as improving in all parameters.
**The CoreToneVolume:**
Table 73 gives an overview of the conclusions and interpretations of the process according to the five parameters of the CoreToneVolume.

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<tbody>
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<td>0</td>
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<tr>
<td>2. Assessment</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
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<tr>
<td>3. Assessment</td>
<td>+</td>
<td>+</td>
<td>-</td>
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<td>-</td>
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<tr>
<td>1. - 3. Assessment</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 73: The process of BC’s CoreToneVolume over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

The process can be described as improving in three out of five parameters from the first to the second assessment, and deteriorating in two out of five parameters. From the second to the last assessment the process can be described as improving in three out of five parameters, and deteriorating in two out of five parameters. Compared to the first session, the last session can be described as improving in three out of five parameters, and deteriorating in two out of five parameters. The pattern of the CoreToneVolume follows the same pattern as the CoreTone from the second assessment to the last assessment, but does not follow the same pattern from the first to the second assessment, and from the first assessment to the last assessment.

**The Song:**
Table 74 gives an overview of the conclusion and interpretation of the process according to the five parameters of the Song.

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<tbody>
<tr>
<td>1. Assessment</td>
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<td>2. Assessment</td>
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<td>0</td>
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<tr>
<td>3. Assessment</td>
<td>+</td>
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<td>+</td>
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<tr>
<td>1. - 3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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</tbody>
</table>

Table 74: The process of BC’s Song over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

The first session is missing. BC’s process can be described as improving in all four parameters from the second to the last assessment. The pattern of the process of the Song does not follow the process of the CoreTone and the CoreToneVolume from the second assessment to the last assessment, and from the first assessment to the last assessment.
**Chapter 8**

*The Improvisation:*
Table 75 gives an overview of the conclusions and interpretations of the process according to the six parameters of the Improvisation.

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<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2. Assessment</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>- (0)</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>1. - 3. Assessment</td>
<td>- (0)</td>
<td>+</td>
<td>+</td>
<td>+</td>
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</tbody>
</table>

Table 75: The process of BC’s Improvisation. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

The process can be described as improving in five parameters out of six parameters. In one parameter out of six, the fundamental frequency, the process can be described as deteriorating from the first to the second assessment. However, BC starts on the same pitch in all three assessments. From the first to the last assessment the pattern of the process is the same and can be described as improving in all parameters, except for the fundamental frequency.
Conclusion and interpretation

Four parameters were missing and this leaves 21 parameters possible to evaluate from the first to the second assessment (see Song). From the first to the second assessment the process improves in 18 out of 21 parameters. In two parameters the process is deteriorating, and in one parameter as neither improving nor deteriorating.

From the second to the last assessment the process is being described as improving in 16 out of 25 parameters, and as deteriorating in 8 parameters. In one parameter the process is described as neither improving nor deteriorating.

Therefore it can be concluded that there is equivalence across the exercises from both the first to the second assessment and the second to the last assessment in describing the process as improving.

Relating the pattern of the process in the assessment to the pattern of the process reported in clinical practice, it can be concluded that they are congruent.

The process of the CoreToneVolume parameters is however not clear and the process does not follow the same pattern as the rest of the exercises. All the processes of the exercises except for the CoreToneVolume follow BC’s music therapy process as described in chapter 8.2. This finding indicates that the CoreToneVolume should be considered to be excluded in the VOIAS profile. Furthermore the exercise is quite similar to the CoreTone except for the crescendo in intensity.

The process from the first to the last assessment is described as improving in 22 out of 25 parameters. In one parameter in the Improvisation exercise the process is described as neither deteriorating nor improving, and 2 out of 25 parameters the process does not move, which may be viewed as deteriorating. Therefore the process from the first to the last assessment can be described as significantly improving. Relating this assessment of the therapeutic process over time it can be concluded that it is congruent with the process reported in clinical practice.

Comparing the psychoacoustic results with the statistical results of the process there is equivalence in the description of the process of the assessment across the exercises from the second to the last assessment (see table 76). The conclusion of the statistical analysis indicated that three independent music therapists and the researcher measure BC’s therapeutic process as significantly improving from the first to the second assessment and over time.

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<tbody>
<tr>
<td>1.</td>
<td>0</td>
<td>+ significant</td>
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<td>2.</td>
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| Table 76: BC Improving (+), Deteriorating (-), Neither improving nor deteriorating (0)
8.7.3 The pattern of DC’s process across the exercises

In the first and second assessment DC spontaneously happened to sing a song instead of improvising. Therefore there is no process analysis of the improvisation.

**The Glissando:**
Table 77 is an overview of the conclusion and interpretation of the process according to the four parameters of the glissando.

<table>
<thead>
<tr>
<th>DC</th>
<th>1. Pitch range</th>
<th>2. Max. asc. vs Max. des.</th>
<th>3. Ending pitch vs. Max asc.</th>
<th>4. Time based analysis</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
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<td>+</td>
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<td>3. Assessment</td>
<td>-</td>
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<tr>
<td>1. - 3. Assessment</td>
<td>-</td>
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</table>

Table 77: DC The Glissando - Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

DC’s process can be described as improving from the first to the second assessment, but then from the second assessment to the last assessment in three out of four parameters the process can be described as deteriorating. In the last parameter (the ending pitch related to the highest reached pitch in the ascending glissando) the process can be described as improving further from the second to the last assessment. From the first to the second assessment the process can be described as deteriorating in three parameters and improving in one parameter.

**The CoreTone:**
Table 78 gives an overview of the conclusions and interpretations of the process according to the six parameters of the CoreTone.

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<tbody>
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</table>

Table 78: The process of DC’s CoreTone over time.
Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

The process can be described as improving in four out of six possible parameters from the first to the second assessment, and deteriorating in two out of six parameters. From the second to the last assessment the process can be described as improving in all parameters. Compared to the first session, the last session can be described as improving in all parameters.
The CoreToneVolume:
Table 79 gives an overview of the conclusions and interpretations of the process according to the five parameters of the CoreToneVolume.

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<tr>
<td>2. Assessment</td>
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<td>+</td>
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<td>1. - 3. Assessment</td>
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</table>

Table 79: The process of DC’s CoreToneVolume over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

The process can be described as improving in three out of five parameters from the first to the second assessment, and deteriorating in two out of five parameters. From the second to the last assessment the process can be described as improving in four out of five parameter, and deteriorating in one of the five parameters. Compared to the first session, the last session can be described as improving in all five parameters. The process of the CoreToneVolume follows the same pattern as the CoreTone from the first assessment to the last assessment, but not from the first to the second assessment, and the second to the last assessment.

The Song:
Table 80 gives an overview of the conclusion and interpretation of the process according to the five parameters of the Song.

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<tbody>
<tr>
<td>1. Assessment</td>
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<td>0</td>
<td>0</td>
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<tr>
<td>2. Assessment</td>
<td>-</td>
<td>+</td>
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<td>3. Assessment</td>
<td>+</td>
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<td>+</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 80: The process of DC’s Song over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

The process can be described as improving in two out of four parameters from the first to the second assessment. From the second to the last assessment DC’s process can be described as improving in all four parameters. Compared to the first assessment there is an improvement in all parameters over time.
Comparing the same parameters examined in the CoreTone exercise the pattern of the process of the Song follows the same pattern. The fundamental frequency and the intensity decrease from the first to the second assessment.
Conclusion and interpretation:
In this case the analysis of the improvisation is missing as mentioned above. From the first to the second assessment the process is being described as improving in 13 out of 19 parameters, and as deteriorating in 4 parameters. In two parameters the process could neither be described as improving nor deteriorating. From the second to the last assessment the process is described as improving in 15 out of 19 parameters from the second to the last assessment. In 4 parameters (The Glissando) the process can be described as deteriorating.

The process from the first to the last assessment is described as improving in 16 out of 19 parameters. In three parameters in the Glissando-exercise the process is described as deteriorating. Therefore the process from the first to the last assessment can be described as improving steadily over time.

The Glissando differs from the rest of the exercises in the description of the process of the assessment. The assessment of the glissando captures that DC is deteriorating from the second to the last assessment. Relating the description of the process reported in clinical practice to the description of the process of the assessments, it is revealed that the description of the process in the assessment of the glissando follows the same pattern as in clinical practice. It may then be concluded that the analysis of the glissando is capable of capturing something in process, which should be looked more closely into clinically.

From the first to the second assessment all the exercises capture DC improving from the first to the second assessment. Relating this to the description in clinical practice, this differs from DC’s own experience of his state of being, and what is reported in clinical practice. However I cannot help reflecting upon what then happens. Shortly after this assessment DC is offered more anti-depressive medicine, and closely after the last assessment he turns manic. My clinical music therapeutic experience has often showed me that small changes are revealed in the music before it actually has become conscious to the client or is clearly observable in other fields. I wonder if the voice assessment actually here indicates a potential to capture small movements, which could be quite important in a decision like offering more anti-depressive medicine - versus waiting a week and see what happens, because the voice assessment shows improvements.

Comparing the psychoacoustic results with the statistical results of the process there is equivalence in the description of the process of the assessment across the exercises from the second to the last assessment (see table81). The conclusion of the statistical analysis indicated that three independent music therapists and the researcher measure DC’s therapeutic process as significantly improving from the first to the second assessment and over time.

<table>
<thead>
<tr>
<th>1. assessment</th>
<th>0</th>
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<tbody>
<tr>
<td>2. assessment</td>
<td>+ significant</td>
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<tr>
<td>3. assessment</td>
<td>+</td>
</tr>
<tr>
<td>1. assessment - 3. assessment</td>
<td>+ significant</td>
</tr>
</tbody>
</table>

Table 81. DC Improving (+), Deteriorating (-), Neither improving nor deteriorating (0)
8.7.4 The pattern of BD’s process across the exercises

*The Glissando:*
Table 82 gives an overview of the conclusion and interpretation of the process according to the four parameters of the glissando.

<table>
<thead>
<tr>
<th>BD</th>
<th>1. Pitch range</th>
<th>2. Max. asc. vs Max. des.</th>
<th>3. Ending pitch vs. Max asc.</th>
<th>4. Time based analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 82: BD The Glissando - Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

BD’s process can be described as improving in all parameters from the first to the second assessment. From the second to the last assessment the process can be described as improving in two parameters and deteriorating in two parameters. Comparing the first assessment with the last assessment the process can be described as improving in all parameters.

*The CoreTone:*
Table 83 gives an overview of the conclusions and interpretations of the process according to the six parameters of the CoreTone.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 83: The process of BD’s CoreTone over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

The process can be described as improving in all six parameters from the first to the second assessment. From the second to the last assessment the process can be described as deteriorating in four out of six parameters, but improving in two out of six parameters. Compared to the first assessment to the last assessment the process can be described as improving in all parameters.
Chapter 8

The CoreToneVolume:
Table 84 gives an overview of the conclusions and interpretations of the process according to the five parameters of the CoreToneVolume.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>+ (0)</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>- (0)</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
<td>+ (0)</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 84: The process of BD’s CoreToneVolume over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

The process can be described as improving in three out of five parameters from the first to the second assessment. However, the pitch does not change. The process can further be described as deteriorating in two out of five parameters. From the second to the last assessment the process can be described as deteriorating in four out of five parameters, and improving in one parameter. Compared to the first session, the last session can be described as improving in three out of five parameters, and deteriorating in two parameters out of five parameters. The fundamental frequency does not change. The pattern of the process of the CoreToneVolume does not follow the same pattern as the CoreTone.

The Song:
Table 85 gives an overview of the conclusion and interpretation of the process according to the five parameters of the Song.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1. - 3. Assessment</td>
<td>+ (0)</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 85: The process of BD’s Song over time. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

The process can be described as improving in three parameters out of four parameters from the first to the second assessment. One parameter is deteriorating. From the second to the last assessment BD’s process can be described as improving in one parameter out of four parameters, and deteriorating in three out of four parameters. Compared to the first assessment there is an improvement in two parameters out of four parameters, whereas one parameter clinically can hardly be described as improving since the pitch does not change.
**The Improvisation:**
Table 86 gives an overview of the conclusions and interpretations of the process according to the six parameters of the Improvisation.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assessment</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2. Assessment</td>
<td>+</td>
<td>0</td>
<td>+</td>
<td>0</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>0</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>1 - 3. Assessment</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>0</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 86: The process of BD’s Improvisation.
Improving (+), Deteriorating (-), Neither improving nor deteriorating (0).

The process can be described as improving in four parameters out of six parameters. In two parameters, the pitch range and the duration, the process can neither be described as deteriorating nor improving from the first to the second assessment. From the second to the last assessment the process can be described as improving in three out of six parameters, and deteriorating in three out of six. From the first to the last assessment the pattern of the process is the same.

**Conclusion and interpretation:**
From the first to the second assessment the process is described as improving in 20 out of 25 parameters, and as deteriorating in three parameters. Therefore it can be concluded that there is equivalence in the description of the process of the assessment across the exercises from the first to the second assessment. From the second to the last assessment the process is described as improving in 9 out of 25 parameters, and as deteriorating in 12 parameters. However it can still be concluded that there is equivalence in the results of the assessment across exercises.

The process from the first to the last assessment is described as improving in 16 out of 25 parameters. In two parameters the process is described as neither deteriorating nor improving, which may be viewed as deteriorating. In 6 out of 25 parameters the process is described as deteriorating. However, it can still be concluded that there is equivalence in the description of the process of the assessment across the exercises from the first to the last assessment.

Comparing the psychoacoustic results with the statistical results of the process there is equivalence in the description of the process of the assessment across the exercises from the second to the last assessment (see table 87). The conclusion of the statistical analysis indicates that three independent music therapists and the researcher measure BD’s therapeutic process as improving significantly from the first to the second assessment and over time.

| 1. assessment | 0 |
| 2. assessment | + significant |
| 3. assessment | + |
| 1. assessment - 3. assessment | + significant |

Table 87: BD Improving (+), Deteriorating (-), Neither improving nor deteriorating (0)
8.8 Partial results and conclusion of the employment of a psychoacoustic analysis - VOIAS-2

A psychoacoustic analysis was carried out on five vocal exercises, and a psychological perspective was added and related to the clinical process reported in the introduction of each client. This was done in order to examine the validity and relevance of the vocal exercises and the selected vocal parameters.

In order to evaluate and examine the function and reliability of VOIAS-2 as a whole, the assessment of the therapeutic process was examined across the exercises for each participant. This revealed concrete elements of potentials and limitations of VOIAS-2, which should be considered for further investigation.

Finally, in each case the results of the overall assessment of the therapeutic process were compared with the statistical results of how three independent music therapists and I evaluated the therapeutic process employing VOIAS-1. This was done in order to examine if the pattern was congruent. If so, this would validate the employment of VOIAS-1. In the following the results of this analysis will be presented.

8.8.1 VOIAS-1 versus VOIAS-2
In each case it can be concluded that the assessment of the overall therapeutic process by employing VOIAS-1 is congruent with the overall conclusion of the assessment of the therapeutic process employing VOIAS-2, the psychoacoustic analysis.

This is a promising result which indicates that the employment of VOIAS-1 is valid and reliable in describing the clinical process and the client’s state of being.

8.8.2 The results of the assessments across the exercises
The comparison of the outcome of the assessment of the CoreToneVolume across the exercises is not reliable, and does not make sense when related to the process described in clinical practice. When carrying out the psychoacoustic analysis it also seems more and more unnecessary to include this exercise, which can be described as a variation of the CoreTone exercise. The only difference is that the CoreToneVolume exercise works with conscious expression of intensity / loudness. After having carried out the whole analysis and studied intensity from different perspectives, I have come to the conclusion that the spontaneous performance of loudness is far more important. The CoreToneVolume exercise is an important clinical exercise, but not necessary in an assessment, especially when the purpose is to keep the assessment profile as simple as possible.

The psychoacoustic analysis of the Song reveals that the pattern of the process shows approximately the same pattern as the CoreTone. However, sometimes one single parameter differs. There are several possible explanations for that. One explanation to consider is whether the client’s emotional relation to the song affects the vocal expression. Another explanation is that to evaluate a song psychoacoustically it is necessary to choose one vowel between many pronounced during the projection of the song. Therefore it must be concluded that it is not without complications to select one tone to analyse a song psychoacoustically. And it should furthermore be considered if the selected tone for assessment represents the client or is affected by the client’s relation to the song. Taking these two explanations into consideration, the conclusion is that the song should be excluded from the assessment profile. This leaves three core exercises, the Glissando, The CoreTone and the Improvisation.

8.8.3 The psychoacoustic analysis of the voice is capturing small movements
When studying the pattern of DC’s therapeutic process of the assessment across the exercises the psychoacoustic analysis reveals several potentials of the vocal assessment. First, in describing the therapeutic process
from the first to the second assessment there is equivalence in the description of the process as improving across the exercises. However, DC reports impatience towards his own state of being and does not experience any progress himself, and neither does the staff around him. Therefore, DC is offered anti-depressive medicine (see chapter 8.2). This result indicates that the vocal assessment has potential to reveal directions for the therapeutic process. This can be very important information to be reported to the interdisciplinary team.

Five sessions later DC experiences progress in his state of being, and so does the staff around him. However, shortly after the last assessment DC turns manic and is diagnosed as suffering from a bipolar disorder instead of a unipolar depression. The last assessment of the therapeutic process from the second to the last assessment across the exercises shows equivalence in the description of the process as improving. However, as the only exercise the analysis of the Glissando indicates something else. All four parameters in the Glissando described the process as deteriorating. In other words there is equivalence in the description of the process as deteriorating across the parameters. This indicates that a vocal assessment consisting of different vocal exercises has potential to capture small movements and changes as well as a broader description of the person being assessed, which is important to report to the interdisciplinary team. It furthermore indicates that the CoreTone only captures mood changes. Therefore it can be concluded that it is essential for a vocal assessment to include different vocal exercises, and that the clinical conclusion is not only based on one single vocal exercise.

The description above, as well as the psychological perspective to the psychoacoustic analysis of AB, supports the proposed conclusion and it is clear that both the Glissando and the Improvisation are necessary to ensure the validity of the vocal assessment as a whole. These two exercises differ from the three others in that some of the parameters are quite different from the two other exercises.

8.8.4 The selected vocal parameters for VOIAS-2
The parameters in the exercise of the CoreTone all seem relevant. However, it could be interesting to explore the spectral centroid and the parameter spectrum in more psychoacoustic detail in relation to the approach I have presented relative to a spatial body sensation.

Relative to the analysis of Parameter 5, the visual impression of the pitch contour of the improvisation reveals that the parameter seems unnecessary to analyse, but the fact that it is possible to see the pitch contour of the vocal improvisation is supportive to the analysis as a whole.

8.8.5 The limitations and potentials of VOIAS-2 the psychoacoustic analysis
The limitation in order to carry out a psychoacoustic analysis is that it requires instructions, software and psychoacoustic knowledge. This is the time-consuming part of the psychoacoustic approach, but it could be taught through a training programme. It is my experience that when a routine is accomplished it is easy and fast to carry out several calculations. The Glissando is far easier to approach psychoacoustically than subjectively in a vocal assessment.

8.8.6 VOIAS-1 and VOIAS-2 are complementary
Some parameters cannot be addressed subjectively, but only objectively, and the other way around. As an example, the psychoacoustic analysis of the Glissando offers the opportunity to look into a time based analysis of the exercise. This has shown to be a very important parameter. VOIAS-1 on the other hand offers the possibility of evaluating the parameter fluency.

The possibility of calculating the spectrum, formant contours, and of studying the graphic representations provides substantial relevant informations and when considering dissemination to an interdisciplinary team these two parameters also support an easy adaptation of the analysis. This is confirmed by the several times I have presented the computation of the spectrum and formant
contours at work and at presentations. Therefore the conclusion is that VOIAS-1 and VOIAS-2 are complementary.

8.9 Looking into tendencies according the voice and depression
When focusing on depressive patients in psychiatry the case study design enables the possibility of some consideration to what may be generalized from a number of cases within the same clinical population as a consequence of evaluation over time by looking into eventual tendencies in this group according to the phenomenon in its context - the human voice and depression.

In this research study two men and two women suffering from depression were recruited. The diagnosis of both the men however changed during the treatment. This leaves two women suffering from depression. The results from the analysis both with VOIAS-1 and VOIAS-2, as well as the clinical report point out that the depression decreases over time in both cases.

According to the results above the most reliable vocal assessment consists of three core exercises, the Glissando, The CoreTone and the Improvisation. When looking into theses three core vocal exercises, and relating and comparing the pattern of progress over time within the vocal parameters, they in general follow the same tendencies for the two women.

Looking into the Glissando exercise an extension of pitch range can be observed in both women. As goes for the maximum ascending pitch versus the maximum descending pitch this in both cases is gets higher over time. The ending pitch is clearly improves and the duration of the glissando movement is expands over time.

Looking into the CoreTone exercise the fundamental frequency in both women is gets higher over time, and the spectrum richer and with more intensity. Furthermore is the spectral centroid in both cases indicates that the sound quality moves from a dark sound towards a more light sound. The formant contours are in both cases increases clearer and richer, just as the intensity level of sounding is increasing over time. The duration of the CoreTone is also in both cases longer.

Studying the improvisation the pitch range in both cases extends over time, and the total of the improvisation is longer in both cases. The sounding duration is also longer while the breathing duration decreases over time, and the formant contours are clearer and richer.

In table 88 the tendencies of depression and a decrease of depression are presented.

The result of looking into the tendencies according to the voice and depression in relation to two women recruited for this study is that the tendencies of the vocal parameters in the three core exercises, the Glissando, the CoreTone and the Improvisation follow the same pattern, and therefore show the same tendencies. The tendencies confirm my clinical experience. It is however not a result with validity. In order to do that the sample is far too small, but it does indicate that it is worthwhile to look more into this by recruiting a larger sample of women and men, both in order to examine if the same tendencies appear in both men and women and if the vocal parameters follow the same tendencies within each gender.

Summary of chapter 8
Chapter 8 examines the quantitative possibilities of assessment as well as the considerations and the choices made in selection of psychoacoustical methods. An employment of an objective approach of assessment (VOIAS-1) with VOIAS-2, a psychoacoustic analysis, has been examined, and the psychoacoustic analysis has included an ongoing psychological perspective.

It was found that the assessment of the overall therapeutic process by employing VOIAS-1 is congruent with the overall conclusion of the assessment of the therapeutic process employing VOIAS-2, the psychoacoustic analysis. This is a promising result indicating that the implementation of VOIAS-1 can be valid and reliable in describing the clinical process and the client’s state of being. Furthermore it was found that VOIAS-1 and VOIAS-2 are complementary.
There are indications that the CoreTone only captures mood changes. Therefore it can be concluded that it is essential for a vocal assessment to include more than one single exercise, and that the clinical conclusion cannot be based solely on one single vocal exercise.

It is revealed that the most reliable vocal assessment consists of three core exercises, the Glissando, The CoreTone and the Improvisation.

A vocal assessment consisting of these three vocal exercises has the potential to capture even small movements and changes as well as broadening the description of the person being assessed. In other words, it can provide essential information relevant to report to the interdisciplinary team.

Additionally it is concluded that training is necessary for a person to carry out a psychoacoustic analysis. However, the necessary skills can be easily taught.

<table>
<thead>
<tr>
<th>Vocal parameters</th>
<th>Depression</th>
<th>A decrease of depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glissando</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Pitch range</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Maximum ascending pitch vs. max. descending pitch</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Ending pitch</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Sounding duration</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Breathing duration</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>CoreTone</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Fundamental frequency</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Spectrum</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Spectral centroid</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Formant contours</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Intensity</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Duration of CoreTone</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Improvisation</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Pitch range</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Time bases analysis of Improvisation in total</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Sounding duration</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Breathing duration</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Formant contours</td>
<td>↑</td>
<td>↑</td>
</tr>
</tbody>
</table>

Table 88: Vocal parameters found relevant to look into in relation to study their tendencies in depression and in an observed decrease of depression.
In the meeting between the client and the therapist in the sounding space a selfmotivated action is created and takes form in the intention to engage, grow, and expand into the field of play.

Carolyn Kenny
9. Exploring the pattern across assessments - a triangulation

In order to address research question number five: Will the assessment / voice assessment analysis provide valid and reliable data when applied in clinical practice? a combined methodological and data triangulation was carried out with data from one client, AB. To enhance the psychological interpretation in the psychoacoustic analysis and the pattern revealed describing the therapeutic process over time, this will be related to:

1) The pattern of the music therapy process.

2) The client’s scores on the Hamilton Depression Rating Scale.

3) The client’s scores on the 10 point Visual Analogue Scale (VAS).

4) AB’s drawings from the music therapy treatment.

5) The statistical results determining the VOIAS profile’s possibility of apprehending the client’s individual overall changes.

In this way, the conclusion concerning the relevance of going further with the development of a voice assessment tool is also viewed from the perspective of clinical practice.

There are different reasons why AB was chosen. The focus on diagnosis for this study is depression, and both the men changed diagnosis during the treatment, and this left me with the two women who were both diagnosed as severely depressed in the beginning of the treatment. However, a Hamilton Depression Rating Scale test was made in AB’s case, as well as a 10-point Visual Analogue Scale (VAS) identifying AB’s individual sufferings. This was scored in the first and last session of the music therapy treatment.

The pattern of the therapeutic process in the psychoacoustic analysis (chapter 8.7) revealed that there was equivalence in the description of the process of the assessment across the exercises from the first to the second assessments, namely as deteriorating. It was furthermore concluded that there was equivalence in the description of the process of the assessment across the exercises from the second to the last assessment, and in the description of the process from the first to the last assessment, namely as improving. It was also concluded that the process of improvement occurred in the period from the second to the last assessment.

9.1 The pattern of the music therapy process

During the Psychodynamic Voice Therapeutic treatment AB regularly explored the sensation of the CoreTone. In the meeting between the client and the therapist in the sounding space (see chapter 4.7.2.1) a self-motivated action is created and takes form in the intention to engage, grow, and expand
into the field of play (Kenny 2006), as well as to develop wholeness. In between, AB also explored the sensation of allowing a vocal improvisation to emerge from sounding the CoreTone (see chapter 4.7.3). In doing that the client allows her / himself to explore the possibilities and basic conditions (Kenny 1989) of a living space. The melody or rhythmical pattern is considered a way of expressing ourselves and interacting in the world, and in the clinical improvisation we can actualise ourselves through a creative force (Kenny 1989). Very often AB, immediately after sounding, was offered the opportunity to express the experience of the vocal exercise in a mandala circle drawing.

The process reported in clinical practice was described as improving until the 6th session. Then there was a pause in the music therapy treatment for 2 ½ months. AB was invited to a verbal follow-up session, and then in the following session, the seventh, the second assessment was carried out. In this session it furthermore became clear that AB’s state of being had deteriorated, and AB experienced her state of being as even worse than in the first session. The clinical process was then described as deteriorating during the pause. From the seventh session the therapeutic process reported in clinical practice was described as improving.

9.2 The pattern of the music therapy process revealed by assessment with the Hamilton Depression Rating Scale

The Hamilton Depression Rating Scale (HAM-D) was developed by Dr. Max Hamilton of University of Leeds, England. HAM-D is not a diagnostic instrument, but a method widely used in clinical practice, which comprehensively determines a patient’s magnitude of depression before, during and after treatment, and it has become standard in pharmaceutical trials. The scale has undergone a considerable amount of psychometric study and is accepted as a valid standard of symptom outcome assessment in studies of severe depression. It is recommended that it be administered by a clinician experienced in working with psychiatric patients.

The scale assesses a constellation of symptoms. The HAM-D used in this study contains 17 items that are considered most consistent in detecting change. HAM-D gives representation to the area of anxiety and physical symptom distress, and surveys a wider range of purely psychiatric symptoms. The HAM-D is conducted as a semi-structured clinician-rated interview. The scoring on the HAM-D ranges across a smaller number of anchor points, and varies from item to item. The sum of scores can vary between 0 - 52.

Though the HAM-D is used worldwide, there are small differences in the interpretation. I therefore in this study describe the system which the Psychiatric Hospital in Tórshavn refers to. This is also described in “Klinisk Psykiatri” (Moes et al. 2009).

If the client scores between 13 and 17 points in the HAM-D this indicates a mild depression. A score between 18 and 24 indicates a moderate depression, and 25 - 52 a severe depression.

In those cases where the HAM-D indicates a severe depression it is recommended also to ordinate medicine.

In AB’s case a HAM-D was carried out by a colleague of mine in the 4th and 12th session of the music therapy treatment. In the 4th session AB scored 29 points on the HAM-D scale, which indicates that AB at that point of the treatment was suffering from severe depression. In the 12th session, where the last assessment also was carried out, AB scored 11 points in the HAM-D scale. This indicates that AB in the 12th session was mildly depressed.

In conclusion, AB’s HAM-D score changed from 29 to 11 points indicating that the process can be described as improving from the 4th session to the 12th session, and over time.

9.3 The pattern of the music therapy process as expressed in AB’s Visual Analogue Scale (VAS) scores

As mentioned in chapter 6.6.3 it is part of my daily practice to define themes and wishes for the outcome of the psychotherapy treatment in collaboration with the client. In each case
there are individual sufferings. These are identified and a 10-point Visual Analogue Scale (VAS) is constructed at that time. The client marks on the line the point that they feel represents their perception of their current state. This scale is valuable especially when looking for individual change within the therapy process over time. When a mid-way and final evaluation are carried out, the dialogue about the therapy process is based on the individual VAS scores.

In the first music therapy session AB identified her individual sufferings and a 10-point Visual Analogue Scale (VAS) was constructed. On the line AB marked the point that she felt was representative of her perception of her current state in the second and last session.

In conclusion, the VAS scores indicate that the process as a whole can be described as improving from the second session to the last session, and over time.

9.4 The voice and drawings of AB as documentation of her self-experienced process

Psychodynamic Voice Therapy focuses on fostering an experience of being in contact with a personal and psychological “platform” or foundation within; a kind of inner private space following Pedersen’s definition of the three imaginary spaces of being present and communicating (Pedersen 2002), as well as a way to explore internal experiences, thoughts and feelings in the present moment (see chapter 4.7.2.1). The purpose is to come closer to oneself in order to come to know oneself more. During the exploration new experiences emerge as it is lived, pre-theoretically and pre-reflectively (Stern 2010) in an expansion of the person’s living space. This is a concept drawn from the understanding of Merleau-Ponty (2002), as mentioned in the section about the basic theoretical principles behind the awakening with body movement and sound (see chapter 4.4).

In the 2. session AB explored the sensation of the CoreTone, and contact was established to a private space within.

As AB made contact to this private space she experienced her being-in-the-world and described it as a struggle. AB therefore titled her drawing “Struggle” (see picture 1).

In the exploration of the CoreTone in the 5th session AB discovered to her surprise that there was also something light within, though the heavy burden of suffering from depression was the most present sensation in her daily life (see picture 2).

In the 7th session AB explored the sensation of the CoreTone, and contact was made to the private space within, which she experienced and described as an empty and black room (see picture 2). The vibrant sensation of the CoreTone was also weak due to a lost body resonance which was equivalent to losing the ability to feel and sense. As described in chapter 5.4.4, this often gives the person a sensation of a partial loss of self. The sensual perceptions remain abstract and cannot be felt and the space is experienced as empty and hollow; only an experience of emptiness is left. The intercorporeal attunement of tone of voice and other “vibrations” fail (Fuchs 2005).

As the therapy went on, AB moved towards recovery and a sincere experience of being

<table>
<thead>
<tr>
<th>AB’s 10 point Visual Analogue Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy = 3 improving to 7</td>
</tr>
<tr>
<td>Unpleasant pressing sensation in the chest = 8 decreasing to 2</td>
</tr>
<tr>
<td>Tension = 8 decreasing to 4</td>
</tr>
<tr>
<td>Self-esteem and self-confidence = 4 improving to 7</td>
</tr>
<tr>
<td>Feeling guilty and a sensation of not being able to cope = 8 decreasing to 4</td>
</tr>
<tr>
<td>Anxiety = 7 decreasing to 4</td>
</tr>
<tr>
<td>The ability to manifest herself = 3 improving to 5</td>
</tr>
</tbody>
</table>

In the 2. session AB explored the sensation of the CoreTone, and contact was established to a private space within.

As AB made contact to this private space she experienced her being-in-the-world and described it as a struggle. AB therefore titled her drawing “Struggle” (see picture 1).

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As the therapy went on, AB moved towards recovery and a sincere experience of being
Chapter 9

Picture 1: Struggle - in Faroese: “Stríð”

Picture 2: Surprise
Exploring the pattern across assessments - a triangulation

Picture 3: The black room

Picture 4: Here and now - in Faroese: "Her og nú"
closer to wholeness. In the exploration of the CoreTone, AB had an experience of being present and close to her Self, which AB drew in the following way (see picture 4) and titled the drawing “Here and now”.

In conclusion, AB’s drawings visualise and describe her experience of the therapeutic process as improving from the second session to the fifth session. Then the seventh session described a deterioration of the process, which then changed again. The last drawing described the further process as improving.

9.5 The pattern of the therapeutic process as revealed in the statistical analysis of the first tryout of VOIAS-1

The statistical results determining the VOIAS profile’s possibility of apprehending the client’s individual overall changes revealed that the therapeutic process improved significantly from the second assessment to the last assessment.

A Profile Plot (see figure 1) pictures the pattern of the process as deteriorating from the first assessment to the second assessment, and as improving from the second assessment to the third assessment, as well as improving over time from the first assessment to the last assessment.

The conclusion is that the statistical analysis indicates that three independent music therapists and I measure AB’s therapeutic process as improving significantly from the 2. assessment to the 3. assessment. The Profile Plot indicates that the pattern of the therapeutic process can be described as follows (see table 1):

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. assessment</td>
<td>0</td>
</tr>
<tr>
<td>2. assessment</td>
<td>-</td>
</tr>
<tr>
<td>3. assessment</td>
<td>+ significant</td>
</tr>
<tr>
<td>1. assessment - 3. assessment</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 1. Improving (+), Deteriorating (-), Neither improving nor deteriorating (0)
9.6 Partial conclusion of the triangulation of data from the music therapy process
A triangulation has been carried out in order to validate the VOIAS profile as a whole, and the relevance of going further with the further development of a voice assessment tool is also viewed from the perspective of clinical practice.

Data and patterns describing the therapeutic process were examined from different perspectives:

1) The clinical description of the music therapy process.

2) AB’s self-experience as illustrated by drawings

3) by AB’s evaluation of her Visual Analogue Scale.

4) AB’s scores on the HAM-D scale, and finally

5) by the statistical analysis indicating how three independent music therapists and I measured AB’s therapeutic process in the employment of VOIAS-1.

The description and illustration of the patterns of the therapeutic process are congruent, and this is a promising result indicating that VOIAS can be a valid tool, providing clinically relevant information about the therapeutic process and the client’s state of being. One case triangulation is however not enough to validate the method, but it provides a promising starting point for further research.
So she tried, and I have never heard such a strange voice. I was astonished, amazed, and curious, and many questions popped up in that second, and it is an experience and story which follows me in my work even today. All sounds has a need to be met and acknowledged.

Sanne Storm
10. Conclusion and discussion

In the following the discussion and conclusion will be presented. First, a summary of the results and findings will be presented. Then follows a discussion of findings in relation to previous research and an evaluation of the study design. Different topics will then be addressed and discussed including my own voices in the study. Furthermore, the clinical applicability of the voice assessment profile will be discussed as well as directions for future research in relation to the profile. Finally, a conclusion of the study will be presented.

10.1 Summary of results and findings
The first main question of this study was: What constitutes a valid and reliable voice assessment tool for clinical music therapy practice?

Based on the findings from the first trial of the developed voice assessment profile, (VOIAS-1), in chapter 7 a valid and reliable voice assessment tool is composed of a manual with clear definitions of the different vocal parameters, and clear guidelines for how each parameter should be assessed. The use of a Likert-scale in the assessment of the different vocal parameters ensures a structured and controlled way of assessing subjective scorings. Furthermore, it ensures the inclusion of certain vocal characteristics describing the voice quality, and it gives a score on how the different tasks were carried out vocally.

Chapter 8 presented assessment of selected vocal parameters and analysed these from a psychoacoustic perspective, called VOIAS-2, using existing computer software. This is a valid and reliable way of analysing voice data. The difficult part is to identify parameters relevant for music therapy and clinical practice. Not all measurable parameters and qualities are relevant or make sense to study and analyse from a clinical and music therapeutic perspective. Furthermore, it is important to consider how data is collected when assessing the human voice. It is essential that the construction of a voice assessment protocol ensures administration in a consistent and stable manner, with standard procedures and psychometric properties. Therefore, the findings are always related to the participant’s clinical process to ensure that the findings make sense and are relevant.

The second main question was: Can this voice assessment tool be used to evaluate change over time?

In chapter 7 this second main research question was addressed in a trial where three music therapists independently used the original voice assessment profile (VOIAS-1) to assess a total of 87 sound files; 57 sound files from clinical practice and 10 sound files collected from non-clinical participants added up three times. Statistical calculations were made on the results of the scoring, indicating that it is
possible to evaluate change over time. The assessment was carried out in the first, seventh and last session of treatment, and a statistical analysis pointed out that the change in therapy was located specifically between the second and third assessment points. In chapter 8 this second main research question was addressed by carrying out psychoacoustic analyses of selected vocal parameters in all five vocal exercises. The results from the quantitative analysis confirmed that it is possible to evaluate vocal changes over time, and even capture small movements and changes even before they are experienced consciously by the client herself/himself or the staff.

The first sub-question was: *How can relevant vocal parameters for a voice assessment tool be identified and operationally defined?*

In order to answer this first sub-question several steps were taken. First a focused literature review was performed to identify studies of vocal assessment within music therapy. The literature appeared to be very sparse. Therefore a second, broader literature review was conducted, focusing on music therapy describing vocal approaches. However, this literature is also sparse. It was therefore necessary to go into more basic literature describing how and why human beings produce sound. This knowledge was then related to the theoretical foundation and clinical approach of my own working method, "Psychodynamic Voice Therapy", as well as to my clinical experience from psychiatry. The listening perspectives are an essential part of this complex - the 'hearing' as well as the 'listening'. I basically consider "listening" a holistic phenomenon representing both objective and subjective elements. In order to support the selected parameters identified in the research literature mentioned above I looked into research on speech and depression. In my opinion, the relevant vocal parameters for a voice assessment tool are identified by asking persistently if each selected parameter gives information relevant for clinical practice. The definition of selected relevant vocal parameters cannot be made without a proper theoretical as well as practical approach to inform it. This led to the development of a manual for vocal assessment which was tried out by three music therapists independently, and their experience in using the manual was followed up by qualitative interviews with each of them. The findings of these interviews resulted in small adjustments of VOIAS-1.

The second sub-question was: *Can inter-rater / assessor agreement be obtained to find consistent outcomes in application?*

This sub-question was examined by statistical computation of the results of the voice assessment, employing VOIAS-1, performed by the three independent music therapists and myself. The statistic calculation demonstrated a very high inter-rater / assessor agreement for VOIAS-1 as a whole (Correlation was significant at the 0.01 level). However, looking more closely into the parameter body, a significant negative correlation between Rater 3 and the researcher was found. Therefore this parameter needs some adjustments if inter-rater / assessor agreement should be obtained. The follow-up interview revealed that the difficulties related to this parameter specifically had to do with how the listening perspectives were approached, and how the parameter was understood. I changed the parameter from a body-drawing, to a Likert-scale. This was done in order to make the evaluation more controlled. Looking into my process of defining this parameter, I may have taken this parameter too far in developing a way of assessing it in a controlled way, and then lost the logical content aspects of the parameter, which may have been obtained through a structured qualitative description.

The third sub-question was: *What guidelines are necessary for assessors to undertake a systematic and consistent evaluation?*

In developing the VOIAS manual the ambition was to make the guidelines as simple as possible. In the end a music therapist should be able to do this assessment in clinical practice, where there is not time to read a thick manual. Too many words and
instructions may discourage the clinician. I minimised the information and definition level to an absolute minimum, and aimed at simplicity in the guidelines. The three independent music therapists were experienced music therapists within psychiatry and teaching, and not known to have taken extra vocal training or education. I knew beforehand that the three music therapists did not know about my clinical approach or way of working with body and voice in clinical practice. Therefore I considered the three music therapists a good choice for evaluating the basic needs for assessors to undertake a systematic and consistent evaluation with this proposal of a voice assessment profile, as well as evaluating if those parameters specifically connected to my way of working needed more explanation or even training.

A follow-up interview was carried out with the three independent music therapists, and it revealed that most of the parameters were explained clearly. Only a few small adjustments were necessary. However, the parameter body was the most difficult for the three music therapists to understand and approach, and the follow-up interviews revealed that much could have been accomplished if there had been a training day for the three independent music therapists. This confirms and explains the inter-rater / assessor difficulties in the body-parameter reported above.

The fourth sub-question was: *What are the potentials and limitations of a vocal assessment tool?*

In order to answer this question several steps were taken. Follow-up interviews were carried out, as mentioned earlier, with three independent music therapists focusing on the experience and function of using VOIAS-1. The follow-up interviews revealed several potentials and limitations.

The potentials were that VOIAS-1, with some training, was easy to handle, and that there actually exist clinically relevant vocal parameters which can be assessed easily. VOIAS-1 offers the clinician a structured and controlled procedure for listening and assessment.

The analysis of VOIAS-2 was related to the client’s therapeutic process. The results of this indicated that a voice assessment has the potential to capture small movements and changes, which may be important information describing the client’s ongoing process. This information may have significant value for the interdisciplinary treatment team, because the information may provide a broader description of the treatment process and the person being assessed. The findings indicated that the most reliable voice assessment was based on three core vocal exercises. These three vocal exercises are all free from semantics and linguistics, and based on primary vocal sounding.

A limitation of the VOIAS as a whole is that in order to fully understand the benefit of the VOIAS, and the need of all three vocal exercises, it is necessary to have some training that gives the clinician both a theoretical and a practical foundation. Presently the psychological interpretation is based on the ontological and epistemological background of the project: the theoretical inspirations underpinning Psychodynamic Voice Therapy.

The follow-up interview addressing VOIAS-1 also revealed that there was a need for the possibility of adding a more qualitative descriptive part to a voice assessment profile, as well as guidelines for how the assessment could be interpreted. Furthermore, the first try-out of the VOIAS-1 confirmed what Colton, Casper & Leonard (2006) described, namely that the subjective determination of pitch is less accurate than through physical measurement, even for very skilled music therapists. The explanation for this may be that the overtones present in the tone affect how the pitch is perceived.

Vocal timbre is very difficult to handle in an assessment. Quantitatively it is only possible to assess a part of the timbre (Spectrum centroid), but it is a fact that the human ear senses and perceives much more than this. The qualitative part of the study tried to approach an assessment of the timbre by developing a bodily oriented and controlled approach of measuring the timbre. This however is substantially influenced by my specific way of listening and working as
explained in chapter four. The "body" parameter was examined closer on the total scores by rater by running a Spearman's Correlation. Spearman's rank order correlation calculation found a significant negative correlation between Rater 4 (the researcher) and Rater 3. The findings indicate that Rater 3 approached the evaluation as a whole differently from the researcher, Rater 1 and Rater 2.

Bearing in mind that the information level was minimised in the first try-out of VOIAS, and because no introduction was given to the three independent music therapists beforehand, space is left for a somewhat optimistic attitude towards the bodily-oriented approach of assessing the timbre in a structured and controlled way.

This optimistic attitude is supported by the response in the follow-up interview where the interviewee was being demonstrated and explained how to approach and understand the body-parameter. This suggests that much may be caught up with by some training. The vocal parameter "body" therefore needs further development and requires self-experience to support the understanding of the approach. It should therefore be examined further how to adjust the "body" parameter so it is applicable.

The problem of measuring and evaluating timbre is that the parameter in many ways differs from all the other parameters. As the only one it is very intangible, yet it is the most important parameter to perceive, because it gives access to the mood and emotional content of the person. Therefore there is a need for allowing a more qualitative descriptive part to be present in the VOIAS, and readjust the profile of the body-parameter. The software PRAAT and the MIR toolbox used in the analysis of the quantitative part of this study is not developed for singing. The results of the analysis however indicate that it is relevant to develop a software focusing on the needs of music therapy in assessing the human singing voice. This can be done quite easily now with the results from this study.

The fifth sub-question was:

**Will the assessment / voice assessment analysis provide valid and reliable data when applied in clinical practice?**

This sub-question was addressed in two steps. The analysis of VOIAS-2 in the three assessments of all four participants was all related to summarised descriptions of each participant’s process in clinical practice in order to examine if the analysis followed the same pattern or was able to offer something to the clinical description of the client and the client’s state of being. This comparison indicated that the assessment and voice assessment analysis do provide valid and reliable data when applied in clinical practice.

It was also found in this analysis that in order to be a comprehensive voice analysis the voice assessment should include three core vocal exercises, the glissando, the CoreTone, and the Improvisation.

Secondly, a combined methodological and data triangulation with data from one participant was carried out. In order to support the psychological interpretation in the psychoacoustic analysis and the pattern revealed describing the therapeutic process over time was related to

1) **the pattern of the music therapy process,**

2) **the client’s scores on the Hamilton Depression Rating Scale,**

3) **the client’s scores on the 10 point Visual Analogue Scale (VAS),**

4) **the client’s drawings from the music therapy treatment,** and

5) **the statistical results determining the VOIAS profile’s possibility of apprehending the client’s individual overall changes.**

The description and illustration of the patterns of the therapeutic process were congruent. This is a promising result indicating that VOIAS can be a valid tool, providing clinically relevant information about the therapeutic process and the client’s state of being. One case triangulation is however not enough to validate the method, but it provides a promising starting point for further research.

All in all, the conclusion is that VOIAS-1 and VOIAS-2 are complementary.
10.2 Findings in relation to previous research
The literature review revealed that there has not been put much research attention into identifying vocal parameters in relation to the human voice within music therapy as a possible source for information about the music therapy process or providing a broader description of the person being assessed. The focus in my research study was to identify vocal parameters which could be part of a vocal assessment profile and possible be employed in assessing how the client’s spontaneous use her or his singing voice as a primary instrument within the music therapy treatment.

10.2.1 The vocal exercises in relation to previous research
In this study the development of VOIAS is based on vocal parameters extracted from the literature review and my clinical approach “Psychodynamic Voice Therapy”. The parameters’ relevance and selection was directed by five clinical applicable vocal exercises, clinical practice and the focus of population in this study; clients suffering from depression.

When studying the literature review most often voice samples are collected by having actors portraying different feelings like happiness, sadness, anxiety and so on. Research studies based on collecting clinical voice samples for analysis are very sparse both within music therapy and in research from other fields and professions focusing on communication of emotions in vocal expression, as well as depression. The aims of the studies were very different, and varied from symptom description, differential diagnosis, state change to change after therapy, which also determined the voice cues tested, and how. The method for collecting voice samples was not discussed either.

In the reviewed studies the fundamental frequency was the only parameter related to the psychological state and emotions. Furthermore it is important to take into account the literature review of other fields and professions focused on speech and research where verbalisation was analysed. Another point is that most of the studies were based on actors and singers interpreting a piece of text or music which expresses the sadness inherent in the depression mode, while very few are based on clinical practice employing a protocol. This confirms that present study is highly relevant. Research within other fields does not differentiate between speech with the intention of expressing a specific emotion and emotions expressed spontaneously. Therefore data collected from clinical practice must be preferable.

In this research study, the selection of the vocal parameters for constructing the VOIAS profile as a whole was directed by five vocal interventions. These were chosen in order to cover how the human voice in general was employed within music therapy. The conclusion of the findings was that a voice assessment profile consisting of three core vocal exercises, the Glissando, the CoreTone and the Improvisation, has the potential to capture even small movements and changes as well as broadening the description of the person being assessed. In other words, it can provide relevant and essential information relevant to report to the interdisciplinary team. These three vocal exercises are all free of semantics and linguistics, and based on primary vocal sounding.

Movement and imagery were connected to the glissando exercise, and modelled to the client. The sounding of the CoreTone was not a spontaneously chosen pitch, but followed a guidance based on a certain theoretical understanding of the CoreTone. To support the creation of an Improvisation it was either possible to walk around or find support in an image of a safe place where the voice freely could be expressed.

The two exercises excluded were the CoreToneVolume and the Song. In excluding the Song as an exercise the VOIAS profile enables an evaluation and structured observations of the human voice free from semantics and linguistics. This limits the bias of the psychological interpretation. When text is involved or a composed song is chosen the exercise may be biased by how the performer relates to the text, the melody, including an implicit a cultural reference for how this
should be carried out, a common standard within the culture maybe. Therefore it is worthwhile discussing the vocal exercises included in a voice assessment protocol in order to collect voice samples as a possible source for information about the music therapy process or in order to provide a broader description of the person being assessed.

As described in chapter 4.2.3 an arousal will always arise and be affected by an encounter interaction. The meeting with other people always arise and effect an arousal, which forms itself into vitality affects and gives an unconscious sensation of pleasure or displeasure. Both pleasant and unpleasant feelings cause bodily sensations and trigger neurotransmitters and hormones. The process is implicit and shapes what Stern calls vitality affects, and the philosopher Susanne Langer’s (1956) notion of forms of feelings. Damasio (1999) links the vitality affects to his definition of background feelings. Background feelings are not always conscious to our mind, and in these situations there is a tendency to focus on other mental matters or contents. Background feelings are more internally directed and may be observable to others in myriad ways like body postures, the speed and design of our movements, and even in the tone and timbre of our voices and the prosody in our speech as we communicate thoughts that may have little to do with the background emotion. According to Damasio (1999), background feelings include fatigue, energy, excitement, wellness, sickness, tension, relaxation, surging, dragging, stability, instability, balance, imbalance, harmony and discord.

Presently the glissando exercise in the voice assessment protocol is very influenced by my way of working clinically. As mentioned above it includes movement and imagery. The client’s performance of the vocal exercise may be affected by the movement and the image. It should be considered whether to exclude imagery in the Glissando exercise. However, it may be advantageous to maintain the movement in the Glissando exercise and the CoreTone exercise and the imagery in the improvisation. The implications of maintain-
have been studied. Furthermore it was concluded that the arousal differences, the underlying emotions within the basic emotion have been neglected (Scherer 2003). Furthermore, the fundamental frequency was the only parameter related to the psychological state and emotions. It was therefore also concluded that it was necessary for researchers to reach beyond single measures of the most common voice cues, such as the speech rate, fundamental frequency and voice intensity (Juslin and Scherer 2008). This study has examined the fundamental frequency and voice intensity as well as a significant amount of other vocal features.

Table 1 provides an overview of the vocal parameters selected and identified as being relevant for further research within the population of depression.

10.2.2.1 Pitch range
In Baker's research study within music therapy pitch range was assessed and applied as a step-wise movement to extend the possibility of vocal expression as a basic training principle (Baker 2004). When assessing pitch range the client was asked to sing the lowest pitch possible to sing without being cued by the music therapist. Then the music therapist played the note one semitone...
lower on the piano and asked the client to try to sing this note. The process was continued until the client was not able to produce any sound. Then the upper range was assessed in a similar way just moving in the opposite direction until the client was not able to produce a sound.

Within research studies from other fields, profession pitch range was studied in relation to speech, and it is described how the pitch range clearly decreases in connection with sadness, depression and boredom (Juslin and Scherer 2008, Moses 1954). According to Moses the pitch range is the language of emotions, and he states that emotions carry within them the reflex of action of shrinking or expanding (Moses 1954).

In this study it is clarified that pitch range is studied by carrying out the open glissando movement. It is understood and approached as a dynamic feature reflecting the client’s state of being. This makes the study of the pitch range in the present study different from previous studies.

The open glissando exercise is a core vocal exercise within Psychodynamic Voice Therapy. By carrying out the open glissando exercise the client’s spontaneous pitch range has been examined from different perspectives. Four parameters were identified as possible to examine and the psychological perspective of the psychoacoustic analysis indicated that each parameter, and the glissando exercise as a whole, reflect and provide essential information about the client’s state of being. As described earlier the glissando exercise is closely connected to primary sounds which is a preverbal feature used in expressing different feelings and reactions of the present situation (Moses 1954, Trevarthen and Malloch 2000, Malloch and Trevarthen 2009). This is the most salient difference of this study’s focus on pitch range compared to other studies. Another essential difference is the approach and examination of the pitch range in this study. I have not come across a similar description anywhere else, even when excluding the imagery and movement. The glissando as a vocal exercise is however not new, it is a very common vocal exercise within vocal training. The pitch range was furthermore studied in the vocal improvisation. This could to some degree be compared with how the pitch range of speech is examined.

10.2.2.2 The fundamental frequency and the CoreTone

As the literature review revealed, the fundamental frequency is the most examined vocal feature. Depression was most often associated with a decreasing fundamental frequency. The literature review furthermore pointed out that the fundamental frequency in most studies has been reported as a rather low mean fundamental frequency for depressive persons in relation to normal persons, or a decreased fundamental frequency in an acute state of depression (review by Scherer 1987). Additionally a small study involving 11 females and 5 males discovered that there were interesting gender differences in studying the fundamental frequency in remission from depressive state. In female, but not male patients, a decrease in minimum fundamental frequency of the voice predicted mood improvement. Scherer suggested that these differences might have been due to differences in the emotions underlying depression (Ellgring et al. 1996).

It is important to have in mind that most of the studies were based on actors and singers interpreting a piece of text or music which expresses the sadness, the depression mode, while very few were based on clinical practice employing a protocol.

In this study the examination of the fundamental frequency was examined in relation to four vocal exercises, the CoreTone, CoreToneVolume, a Song and an Improvisation. The conclusion of the findings was that a vocal assessment in order to be reliable and valid in relation to describing the client’s state of being should consist of three vocal exercises, the Glissando, the CoreTone and the Improvisation. Of these three exercises, the CoreTone consists of therapy related work based on one single tone. The results from studying the CoreTone showed indications for the
CoreTone only to capture mood variations and it was concluded that the study of the fundamental frequency and the CoreTone must not be used as a sole basis for a vocal assessment. Each parameter is to be compared to each other in patterns of movement, and the analysis and interpretation of a single vocal exercise is to be compared to other exercises results. Therefore it was concluded that it was essential that a vocal assessment does not only consist of one single exercise, and that the clinical conclusion should not only be based on one single vocal exercise.

10.2.3 VOIAs in relation to Newham’s ten vocal ingredients
As described in the literature review of Paul Newham’s work, the approach and methodology of Voice Movement Therapy have the same roots as Psychodynamic Voice Therapy. Both methodologies have been influenced by Alfred Wolfsohn, the founder behind the training method “The extended vocal training techniques”. Newham has defined ten vocal parameters or as he labels them, ingredients, of the human voice, which he finds universal to all human beings, and it is within these parameters that his Voice Movement Therapy is framed. These ten ingredients are presented as a key to self-development when they are used as a probe and as a mirror of emotions and reflections while stretching and exploring its acoustic components. Newham’s selected vocal parameters are claimed to address the human voice whether singing, speaking or vocalising spontaneously.

Of the ten vocal parameters, six were included in the VOIAs profile. The following four parameters were not included: register, pitch fluctuation, vowel/articulation and disruption.

Newham describes how “the human voice may be perceived as producing sounds which appear close to a sound usable within the spoken language of a particular culture and which are produced by the shapes of the vocal tract in combination with the movements of tongue and lips” (Newham 1999, pp 139). This can more precisely be defined as sounds similar to vowels or consonants. The clinical experience which this research study provided me with has brought my attention towards the parameter vowel/articulation again. In the very beginning of the treatment of BC with Psychodynamic Voice Therapy there was a session where the CoreTone was identified, and it was decided to work more in depth with the one single tone in order to free, enrich and embody it. BC was instructed to stay with the specific pitch produced as well as sustain an Ab-hound, a vowel pronounced as in the word “farther” or “car”, at a comfortable pitch and loudness level. But the Ab-hound never really matched the sound I was modeling so I introduced different variations of the vowel a related to a horizontal spatial body sensation. These can be defined according to the pronouncement of the words cat, car (father) and core. The word “cat” I relate to a sound moving forwards, the word “car” to the middle of the body, and the word “core” is related to a sound moving backwards or withdrawing.

The Extended Vocal Training applied by Alfred Wolfsohn always suggests an exploration of the quality of the sound, and as mentioned in chapter 4.6.4 he especially worked with four different vocal qualities: the “violin”, “viola”, “cello” and “double bass”. Mendelson and Ryan introduced characters related to these sound qualities like, Antonio (cat), an Italian able to sing to his lover on the third floor, Violetta, a very light and girlish woman, and Boris (core) a big Russian man, solid and dark. Or it could be related to Italian words like amoro (cello). What happened was that when I introduced a sound moving forwards in the body, BC was not able to produce sound - only air, but when I introduced the dark, round sound, a sound moving into the back of the body, BC’s sound quality became richer and fuller. My psychological interpretation was that BC for some reason had a need to be withdrawn. This clinical experience encourages me to reconsider how to define and assess the spatial body sensation, the “body” parameter. According to Newham’s parameter register, I still do not find this parameter relevant reconsidered from a psychological perspective.

Newham’s parameter disruption is to some degree similar to the parameters cracks and holes presented in chapter 7.1.2.1 as consid-
ered for the vocal assessment profile but too difficult to approach presently. As mentioned in chapter 7.1.2.1 the therapeutic decision of going into these cracks and holes is crucial for the outcome of the therapy, and it has to be taken into consideration how many resources the client has at the moment in time, and what the primary needs of the client are. Therefore the cracks, holes and broken sounds are important information or guidance in order to understand the client and the client’s state of being from another perspective at the time of making the assessment.

10.3 Evaluation and discussion of the study design

There is no doubt that the design of this study ended up being very comprehensive and the implications were that the study also ended up being very time consuming. As described in chapter 3 both explorative design and multiphase design are used in instrument / program or theory development, including development of assessment profiles according to Creswell and Clark (2011). As a whole the design of this study was described as an Emergent sequential exploratory mixed methods design with emphasis placed on the second, quantitative phase. In this second phase another two mixed method designs were employed. It could be discussed if some parts of the design could have been left out.

Already a preliminary literature search showed that there did not exist an assessment profile focusing on the human voice within music therapy, and only very sparse research within music therapy focusing on and involving the human voice. The impact of this discovery was that I had to construct such a voice assessment profile as well as the procedures around it myself. As described in chapter 1 a draft for a voice assessment was developed during my music therapy training. I did however find it necessary to study the literature more in depth in order to ensure the selection and extraction of vocal parameters more based on general literature research and not only based on my working method. It was discussed several times with my supervisor if it was necessary to include the psychological interpretation of the measurements outcome, and look into the trustworthiness and relevance of the information for clinical practice as a result of the interpretation. Evaluating the design I still would not exclude this part of the study. The clinical and interdisciplinary relevance of the voice assessment profile is essential. This was the main reason why this study was carried out in the first place.

Then it could be discussed if it was necessary to construct both VOIAS-1 and VOIAS-2. A choice could have been to put more effort into only constructing VOIAS-2, and leave out the construction of VOIAS-1, the first tryout and the follow-up interview. I am confident that this decision is based on my present knowledge and the fact that the possibilities within psychoacoustic analysis expand rapidly and have constantly done so during my research.

The employment of mixed methods in this study has furthermore put the differences of a quantitative and qualitative approach into perspective. In this study the design of the mixed methods drew on many ideas and has employed “what worked”, using diverse approaches, and I have valued both the objective and the subjective knowledge which they have provided. A practical relevance of the voice assessment profile has guided the methodology. Evaluating the process this pragmatic stance still appeals to me and the employment of the mixed methods designs have confirmed that the two methods are complementary. The combination of the two methods has not meant that I abandoned my basic worldview. Reflections on how my basic worldview has influenced this study will be discussed later.

10.3.1 Reflections and implications of the multiple case study design

In this research study the case study utilized an approach of developing a method to observe and collect data and examine the possible evaluation of the human voice as the particular phenomenon in clinical practice. The clinical population in focus was clients suffering from depression. When focusing on depressive patients in psychiatry some considerations were given to what may be generalized from a number of cases within
the same clinical population as a consequence of evaluation over time and look into eventual tendencies in this group according to the phenomenon in its context - the human voice and depression. Robson points out that a very common misconception is that a multiple case study design will provide a generalization to a specific population (Robson 2002). Robson furthermore refers to Yin, who makes the analogy that carrying out multiple case studies is more like doing multiple experiments (Robson 2002).

In chapter 8 the psychoacoustic analysis was provided with a psychological perspective and related to each case and their clinical report. This was a time consuming part of the research, but also a very important and essential part. Had it not been for the multiple case study design I would not have discovered which vocal exercises provided the most important information, and how the assessment profile should be composed to provide the most valid and reliable assessment. These discoveries made me reflect upon and let go of my preunderstanding and expectations towards the voice assessment profile. Furthermore, it was due to the multiple case study design that confirmations were revealed about how the different measurements could point to either a deterioration or improvement in the treatment.

When evaluating the value of the multiple case study design in this study, it is therefore evident that the relevance of the case study design is significant and indispensable in order to provide clinical validity and reliability to the assessment profile.

In this research study two women of four clients represented the clinical population. Each of the women’s therapy process could be described as improving over time according to the clinical reports and the observations. By looking into the three core vocal exercises for assessment and study the tendencies of the vocal parameters it was revealed that the measurements of the vocal parameters followed the same pattern and confirmed the evaluation of the therapy process as improving over time. It is however important not to conclude that this then represents the clinical population. To provide a valid picture of the tendencies within this population a larger group has to be recruited.

Reflecting upon Robson’s point above there is no doubt that depression has certain characteristics. By studying the dynamic features, which in this case are the vocal parameters measured, it is also shown that psychoacoustic measurements like low intensity, limited pitch range and so on are a part of how depression in some cases can be described. But the reasons for low intensity and limited pitch range can be varied, and not only connected to depression as a diagnosis. Studying the dynamic features in isolation the description of low intensity and limited pitch range also fits the description of a person who is very relaxed. In this case there may be some of the dynamic features, like the richness of the overtones, which tell about the person’s basic psychological state of being. Another example is the vocal expression of a person who has just suffered from severe pneumonia. In such a case the vocal sound may be cracked and unsteady, and there is not enough power in the body to provide richness to the sound. If not related to the story of the client it is easy to be misled. A depression can furthermore have an agitated expression, and I am confident that the psychoacoustic measurements then would take another form and structure.

One case in this study revealed that the vocal expression of a person suffering from bipolar disorder, but presently having a depression, provided a different form and structure of the vocal expression. Therefore it is crucial to compare and relate the object for observation from different perspectives, and not only study an object in isolation. Furthermore, depression often is linked with other diagnoses rather than being a main diagnosis. This is also seen in this study where two of the four clients changed diagnosis and other psychiatric difficulties became more prevalent when the depression was reduced. Taking into consideration the ontological and epistemological understanding of Psychodynamic Voice Therapy, the dynamic features are considered an essential part of human
being’s existence, communication and expression. The dynamic features are missing as valid descriptors in the traditional description and definition of depression. The dynamic features are a way of describing the power of the fundamental force in any kind of sensory stimulation in the nervous system, being the basis for the feeling and sensation of vitality, empowerment, energy or a manifestation of being alive. These elements are an essential part of what is missing when suffering from depression and take into consideration that depression also can be described from the perspectives of themes like: the lived and corporeal body, a concept drawn from Merleau-Ponty (2002). The dynamic features will therefore provide a broader approach to and understanding of the nature of depression as a diagnosis.

10.3.2 Reflections on implications and limitations of the VOIAS-1

As mentioned in the development of VOIAS-1 I imagined that each exercise could stand alone (see chapter 6.6). In the follow-up interview the three independent music therapists also had the experience that each of the five exercises could stand alone. But the results from the psychoacoustic analysis and a psychological interpretation related to the individual case addressed the importance of the voice assessment profile to consist of three different types of vocal exercises, the Gis-sando, the CoreTone and the Improvisation. Together, these three vocal exercises offer a more reliable and valid, as well as a broader, description of the person being assessed. The epoché/preconceived opinion about the possibility of applying only one assessment sheet therefore took another direction. Each individual sheet approaching each individual vocal exercise does have the potential to evaluate change over time, but to strive towards accomplishing the purpose with the assessment profile to provide essential information to the interdisciplinary team, VOIAS needs to consist of three core vocal exercises. This changed the whole idea about how VOIAS can be a part of daily practice. The three exercises all represent the client’s psychological state non-verbally, and these exercises are based on primary vocal expression.

The voice assessment protocol was only developed because I had to collect data in order to assess different vocal exercises, but the findings of the study indicates that the voice assessment protocol is possible to apply not only when a client receives music therapy focusing on voice work, but also have the potential of being employed in general in the collaboration with an interdisciplinary team clinical description. The findings of the study indicate that a vocal assessment in this form of only one assessment session is valuable. The VOIAS enables evaluation and structured observations of the human voice performing three core vocal exercises free from semantics and linguistics. There is indication for the assessment protocol to be possible to administer in a consistent and stable manner with standard procedures and good psychometric properties. This brings VOIAS one step closer to standardization. This will be elaborated in chapter 10.7.1.

One limitation is however that VOIAS-1 is very quantitative in its approach. The follow-up interview pointed out the music therapist’s need of the possibility for adding subjective descriptions. It has always been my intention to include the possibility of adding subjective descriptions, and I am confident that when the VOIAS is employed in clinical practice this will be a natural part of carrying out the assessment. It is always important to write down the spontaneous thoughts and experiences, and VOIAS profile will support structuring these.

The follow-up interview revealed that the difficulties of the “body” parameter specifically had to do with how the listening perspectives were approached, and how the parameter was understood. There is no doubt that this parameter is very influenced by my way of listening and working. Evaluating the “body” parameter I think this parameter was taken a step too far when changing the parameter from a body-drawing into a Likert-scale. It then lost the logical content aspects of the parameter, which may have been obtained through a structured qualitative description. A body-drawing can be just as quantitative as a Likert-scale, especially if
the guidelines for evaluating the parameter are even more simple. Vertically, the parameter could focus on evaluating and placing the quality of the voice either according to the head, the throat, or the body. Horizontally it could focus on either evaluating or placing the quality of voice, in the front, the middle or the back of the body.

10.3.2.1 VOIAS is basically a tool for the music therapist

The outcome of the analysis of the follow-up interview considered VOIAS-1 basically a tool for the music therapist and not for the client. I agree that the VOIAS profile basically is a tool for the music therapist to orient herself/himself towards the client, and collect information about the client’s psychological state of being as well as the treatment progress. I would however not exclude the possibility of employing the VOIAS profile as a tool supporting the therapy process. It is my clinical experience that it is possible to reflect and discuss the experience of the vocal sound ongoing in the therapy. This is in order to support a more solid contact to the body and ability to read the body sensation.

Another option is the consideration of how software today is expanding rapidly, and today even offers the possibility of applying real time psychoacoustic analysis. A real time psychoacoustic analysis provides a possibility of visualising how the voice sounds right away. This may under the right circumstances be a programme employed as part of the working method in therapy. I consider it possible to introduce a certain playfulness in connection with how the voice sounds ongoing is visualised. Therefore I basically consider the employment of the VOIAS profile as dependent on the client.

There was furthermore an agreement among the interviewees that VOIAS-1 would only be applicable to certain client groups; clients with the ability to reflect, adults looking for personal development, or out-door patients. This is an interesting stance, because one of the first times I employed a voice analysis it was in connection with a client unable to reflect upon or communicate inner experiences, and this was the basic reason for employing a tool possible to evaluate the “music” in the therapy session. I based my vocal analysis on what may be considered a vocal “improvisation”. The vocal expression was scored according to the version of the voice assessment profile at that time, and the analysis and interpretation were triangulated. It was this clinical experience that pointed out to me what value such a profile could have in clinical practice. Furthermore, I have clinical experience of applying Psychodynamic Voice Therapy to clients suffering severely from either depression or ego weak personality structures as being just on the edge of being psychotic. It is possible, but it requires special sensitive and empathic attention as well as personal and professional resources from the music therapist relative to how to employ body and voice in therapy.

10.3.3 The discussion and evaluation of the sequential transformative design

The sequential transformative design carried out in chapter 8 gave unequal priority to the quantitative and qualitative analysis. A psychoacoustic analysis was employed analysing the data collected by either PRAAT or the MIR toolbox. A psychological interpretation was then carried out, based on a transformative worldview (chapter 4). The quantitative and qualitative methods applied in the sequential transformative design can be described as complimentary and necessary in order to find the relevance of the quantitative approach to an evaluation of the therapy process and the psychological state of the human being.

Evaluating the process of approaching the psychoacoustic field I however would have approached this differently today.

10.3.3.1 The complexity of approaching the world of physics - the psychoacoustics

The results from the psychoacoustic approach part of this study leave no doubt that the voice and its behaviour can be described and evaluated over time by different acoustical features. The measurements furthermore provided an insight into how voice and sensation function. When relating the psychoacoustic measurements with clinical practice and the case story it is furthermore evident that the psychoacoustic analysis...
provided important information about the therapy, the therapy process, and the human being’s state of being.

The outcome of the psychoacoustic approach, VOIAS-2, and the choices made in the process of forming VOIAS-2 is however influenced by me as the researcher. When studying the possible parameters and starting the psychoacoustic analysis, it sometimes came to a point where it was difficult for me to make sense of the analysis, or make sense of the analysis when relating it to clinical practice. The result of this was an exclusion of some parameters.

I am confident that VOIAS-2 has only reached as far as I have managed to cope due to the fact that psychoacoustics is not my primary field. I am furthermore confident that there are many possibilities which are not examined or explored probably because in order to do so it needed a more in depth understanding and knowledge of the physics and the psychoacoustics in measuring sound.

During this study I did consult psychoacoustic expertise on three different occasions and stages of my study, and in each case it also provided me with support and knowledge to go on in the construction of VOIAS-2. But it is also a fact that my knowledge in each case was different and therefore choices made at these stages were influenced by how much I knew at the time. Therefore it is relevant to discuss and evaluate the planning and approaches of this unfamiliar field. The last consultancy where I collaborated shortly with Prof. Eerola from Jyväskylä University could have been better prepared and planned.

Evaluating the outcome of the collaboration I think I should have visited Eerola twice. The first visit supported me into getting started with the PRAAT, and we discussed different possibilities of applying the MIR tool box. The application of the MIR tool box was however partly influenced by my state of knowledge at the time, and the fact that the MIR tool box had not been applied to the human voice before at the time I consulted him. Looking back it would also have been of significance that there had been time set aside to dwell upon exploring and discussing the possible relation of vocalisation, outcome of measurements, body sensations and possible psychological explanations more in depth, and timemark the collaboration of this. An important aspect of such a collaboration is also the financial foundation of it. Therefore I today would apply for financial support to cover the costs of such a collaboration.

Another aspect is the fact that psychoacoustics may be the primary knowledge and approach, but in order to make the relevant choices in forming and constructing VOIAS-2 it is also important to know how the measurements are related to the vocalisation, and the body sensation of sounding. In relation to this it is furthermore evident that the relevance of the parameters is not proportional to what is possible to measure.

The last aspect is then the ability to add a psychological perspective to the measurements, and explore how this may make sense to the experienced and observed state of being of the person vocalising. In order to do so it is necessary to be familiar with the psychological, psychiatric field and knowledge, and not least the client’s own experience.

With the knowledge and the experience I have today I would have chosen to approach the psychoacoustics differently. Today I would have taken an interdisciplinary research approach to this research study based on two or three academic areas. Such an interdisciplinary research collaboration would have provided better conditions for knowledge exchange, which again would have provided better conditions for developing the psychoacoustic part of the VOIAS profile.

Prof. Eerola, Jyväskylä University, states that it will be somewhat easy to make the MIR tool box applicable to the human voice (personal communication). It has just not been done yet. Although I have found my way to some extent in using the PRAAT for analysing the human voice, I am confident that the validity of VOIAS-2 will be better embodied if it is based on an interdisciplinary research collaboration including a music therapist with the human voice and body as a primary instrument in music therapy, and the
field of music psychology. My knowledge of psychoacoustics does not cover this possibility, but it is a first step.

The present outcome of VOIAS-2, this first step, provides reasons to explore and examine the psychoacoustic approach further and more structured. It is however important to validate VOIAS-2 in its present version with a psychoacoustic expert.

10.3.3.2 The limitations of employing the psychoacoustic approach
As mentioned above, there is no doubt about the value of a psychoacoustic approach and analysis of the human voice within music therapy. Additionally there is no doubt that the VOIAS profile has no value if it is not applicable in clinical practice as well as within research. Therefore it is important to reflect upon how to make the psychoacoustic part of VOIAS applicable in clinical practice.

One of the limitations with employing PRAAT and the MIR toolbox as employed in this study is that both PRAAT and the MIR toolbox are too comprehensive and time consuming to approach and employ. This statement is confirmed by studying the stepwise manual for VOIAS-2 applying PRAAT in this study. The manual clarifies that in order to carry out the psychoacoustic analysis, each parameter requires several commands. There are therefore many reasons to believe that this will prevent the music therapist from employing the programme in daily practice. Furthermore it is evident that both programmes require psychoacoustic knowledge and training to be applied, and this may be considered too overwhelming to deal with.

Therefore the solution in my opinion is to construct a version of the programme based on either the MIR toolbox or the PRAAT, which is designed so it only includes the necessary commands and settings options for men and women - a very simple version only focusing on the needs for analysing the three core vocal exercises psychoacoustically. Taking Eerola’s statement described above into consideration this should be possible. This could be a starting point for making the VOIAS-2 applicable in clinical practice.

10.3.3.3 Balancing the quantitative and qualitative approach and analysis
Looking into the origin of the two psychoacoustic programmes there is also a difference regarding the onset of analysing sound. The MIR toolbox is originally composed in order to analyse music, whereas PRAAT originally is composed in order to analyse speech. Both programmes are however primarily developed from psychoacoustical needs. For music therapists the needs may be slightly different when it comes to analysing the data objectively and making the psychological interpretation, as well as considering how to present the results of the assessment to an interdisciplinary team.

The last day at the PEVOC6 conference put things into perspective. The second and final round table consisted of a multidisciplinary team of five people, representing otolaryngology, voice therapy, psychoacoustics, vocalist and singing training. The purpose of the round table was to take up complex cases within the care of human voices. First the case story was told, and then each member of the round table suggested how they would approach and solve this voice problem. In presenting the case story video recordings of how the vocal folds appeared and acted, while vocalising different vocal exercises, it was possible to hear the sound of the client as well. This client had almost lost his voice. I still remember how the client’s voice affected me while listening, because I spontaneously moved my hand up to my throat, because my throat tensed up.

The suggestions of how to deal with the client’s voice problem from the multidisciplinary team were very different, and the most dramatic suggestion was surgery. However the roots of the client’s problem were revealed as psychological. The man had just lost his farther, which in this case meant that he had to take over his father’s place and be responsible for the vocal religious rituals of the community. In doing so he had to carry out a special ceremony in connection with his father’s funeral, which to some extent had to do with singing long pieces alone to the
community. Luckily he got in contact with a vocal trainer / singing teacher, who was holistic in her approach, and therefore besides many other things also asked about his present emotional state. This made him among other things cry and speak about his loss.

The treatment that helped this client was primarily psychological, and it was enough to help him release a substantial amount of the tension and repressed emotions. And this gave him back his voice enough to be able to carry out the singing ritual at his father’s funeral, and avoid surgery.

In summary the case story reflected that there are many ways to take care of the vocal instrument, and it underlined the importance of taking the psychological perspective into serious consideration, something which this voice conference as a whole stated and reminded vocal care people to bear much more in mind in the future.

The whole situation reminded me about the multidisciplinary discussion taking place within psychiatry, when we discuss the observations done, try to set the diagnosis, and make the best choice of treatment. For me it underlined the importance of working multidisciplinary, discussing and reflecting together. The whole interdisciplinary setting at the PEVOC-conference also reminded me about the importance of not forgetting the client and the clinical practice, which are the main purposes of the quantitative assessment.

10.3.3.4 The psychological interpretation of the psychoacoustic measurements
This story therefore is also relevant when considering balancing the psychological interpretation based on quantitative measurements. Tony Wigram (2000) pointed out that we in our language and way of communicating ourselves may be more “therapists” than “music therapists”, thus having a tendency to forget what our colleagues in the natural science professions regard as our strength; the music. Therefore, when communicating with other professionals, we must develop a language that can define as well as describe what musical events we base our interpretation upon, in a clear and understandable way.

Our profession includes elements from many different fields, and as such we must be conscious about how we as music therapists balance our approach and interpretation, and how we communicate this to our colleagues. This discussion is not the focus of the present study. However, this consideration constantly influences my approach to the human voice and the topic of this study.

Thinking of the clinical improvisation it is clear that when being able to see the improvisation in total it offers the opportunity of spotting something and then going into details. This I compare with the first step of the methodology of the morphological approach of analysing a clinical improvisation (Tüpker (1988, 1996, 2001). Here it is assumed that any man or woman will be able to hear the story of the client. I have experienced the same when presenting the computed graphic pictures of the different improvisations. The picture speaks and with small comments can something quite complex easily be told. So in a way the hard core software computation suddenly addresses the viewer’s intuition, but having a picture support the statement of the therapist.

There is no fact. A decreasing glissando does not always mean a limitation. If the sound is rich, the decrease of the pitch range needs to be viewed in relation to this.

10.4 Reflections upon employing the voice assessment protocol to collect data
When designing and developing the voice assessment protocol for collecting data it was important for me to select different vocal interventions, not only those representative of my own working method Psychodynamic Voice Therapy. My aim was to design a general model of a voice assessment profile focusing on the human voice, meaning that the voice assessment profile was aimed at consisting of different voice assessment sheets directed towards certain vocal interventions, which then could be applied if or when a music therapist was working with a client who was singing or doing vocal exercises. In that way the protocol to collect data for this
study ended up with five different vocal interventions in order to cover different therapeutic approaches.
It was furthermore my aim to develop and design an effective and systematic procedure for collecting data, while still taking into consideration the importance of applying a certain level of free flow. Additionally taking into consideration being realistic about what was applicable in clinical practice. Considering the needs of the client group in focus for this study. As mentioned in chapter 6.6 the challenge for me was to integrate the song and the improvisation in the protocol in a way that felt natural for the client and myself to carry out. If this failed the risk was that the client would experience the protocol as too overwhelming to carry out.

The employment of the voice assessment protocol turned out to be easier than expected. It has made me realize that I had a preconceived opinion about when it was possible to apply the improvisation as a vocal intervention. My experience of applying the developed voice assessment protocol taught me that much is possible if prepared and presented to the client in the right way. I am confident that this has to do with the flexibility the protocol offers, although the protocol is also very strict when it comes to the five vocal exercises, and how these five exercises have to be carried out.

The form and structure of the voice assessment protocol allows space to work your way through the different exercises which grow naturally in complexity, and furthermore offers the necessary space to be flexible, supportive and accommodating during the assessment.

The development of the voice assessment protocol has in addition turned out to be clinically applicable. Lars Ole Bonde\(^1\), a colleague within psychiatry for many years, took the initiative in trying out and applying the developed voice assessment protocol with one of his clients in clinical practice, and provided me with a recording of the assessment for potential analysis. Bonde himself experienced the employment of the protocol as uncomplicated and straightforward to apply as well as administer. Listening to the recording, Bonde starts by preparing the client for the vocal exercise, explains the content of the vocal exercise, and then models it once. Then follows the client’s performance of the exercise. Bonde carried out four of the five vocal exercises, following the suggested order of the vocal exercises in the voice assessment protocol. In Bonde’s assessment the CoreTone exercise was left out, and the Glissando exercise was carried out in a variation. Bonde applied the glissando movement as two individual sections, an ascending glissando and a descending glissando. In the voice assessment protocol it is the open sounding glissando movement (see chapter 4.7.1.3), an ascending and descending glissando movement carried out as one exercise only divided by the act of breathing in.

The four exercises were carried out in a playful manner, and the atmosphere appeared to be very relaxed and natural. All in all, incorporating the guidance and explanations as well as short follow-up reflections about the subjective experiences in connection to each vocal exercise, the assessment was performed in around 10 minutes. Bonde was not instructed directly or beforehand, but it should in this connection be mentioned that Bonde has followed the process of developing both the voice assessment profile and my working method Psychodynamic Voice Therapy from the very beginning. Therefore it should be taken into consideration that Bonde knows and understands the purpose of the vocal exercises very well. Additionally, Bonde is an experienced clinician and singer.

Still, I find this a promising result because it indicates that the assessment protocol can be applied by other clinicians, even with very little training and instruction. Furthermore it indicates that the protocol has the potential of being administered in a consistent and systematic manner. Finally, it can be con-

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\(^1\) Lars Ole Bonde, professor, a dynamic researcher within music psychology and “music and health” and psychiatry and a clinician, as well as an associated trainer in the method Guided Imagery and Music (GIM) - Mind and Music-institute, Copenhagen. Bonde is presently my supervisor, but has also been a colleague within psychiatry for many years.
cluded that the voice assessment protocol is not time-consuming. Wigram and Wosch argued that in order to provide the necessary validation and clinical application it is important to provide protocols which include systematic instructions (Wigram and Wosch 2007). It is the consistency and structure that provide reliability and trustworthiness, and ensure that the scores are comparable. The voice assessment protocol has these potentials, because the protocol is simple and not time consuming. However, in order to provide the best conditions to insure assessor interrater reliability in clinical trials and the scores to be comparable, it is important to apply training facilities.

10.4.1 Being flexible as well as structured

Taking the client into consideration, and aiming to prohibit an assessment situation from being intrusive or awkward, it is therefore important to be able to apply and carry out an assessment protocol in an authentic and natural manner. This may challenge the flexible attitude which a therapist often prioritises highly. The flexible attitude facilitates the meeting between the therapist and the client, and it supports the therapist in being present and supportive. So the question is how to be flexible as well as structured.

A basic condition which in my opinion supports a flexible attitude towards the protocol is first of all that the music therapist would have to be able to see the purpose of carrying out the assessment, and trust that the assessment will provide information which also can be supportive for the further and overall treatment for the client. This is especially needed when a new assessment profile has to be introduced to the field, and where the purpose is to establish its value as an assessment profile. In order to gain this trust, information about the purpose and the profile needs to be provided to the music therapist applying the assessment protocol.

Secondly it is a fact that the more the music therapist is familiar with the vocal exercises, the easier the assessment protocol is to handle and apply in a natural, authentic and support-

ive way. So basically the music therapist also needs to have an interest in and to resonate with therapy related body and voice work. The voice assessment protocol of this study including three core vocal interventions is not difficult to learn or carry out, but the authentic and natural manner goes hand in hand with the therapist’s own relation to her or his voice. This will be discussed in more detail later.

The question is how the flexibility can be integrated in applying the voice assessment protocol in daily practice and how flexibly the protocol can be addressed. As described in chapters 4 and 6 Psychodynamic Voice Therapy provides a natural transition to the voice assessment by integrating the mandatory grounding exercises (see appendix 7). However, studying how Bonde applied the vocal assessment it is shown that these mandatory grounding exercises do not necessarily need to be the way. Bonde did not apply these, but found his own way of applying the voice assessment profile in a natural and authentic way. So it is possible to approach the employment of the fixed design of the vocal assessment in a flexible manner. It should therefore be possible for each music therapist to find his/her own natural and authentic way.

The question is furthermore how to build up a familiarity with the vocal exercises. Is it necessary to participate in live training sessions or would it be possible to obtain the familiarity by following instructions given on a video? Obstacles to rater training and reliability testing include logistic difficulties in providing live training sessions. Therefore it should be a goal that the voice assessment protocol can be assimilated by following a web-based training video. By composing a web-based training video the design could take into consideration carrying out the vocal exercises as well as providing space for the music therapist to follow the instructions and try the exercises out under this instruction in the exact same way as it should be introduced to the client. In that way the therapist has personally tried out the assessment profile before applying it and at the same time he/she is provided with the fixed structure of the
10.5 Clinical applicability of the VOIAS profile

The findings of the research study indicate that a voice assessment has clinical as well as interdisciplinary relevance to apply in assessing clients suffering from depression, and assessing the music therapy treatment based on therapy related voice work. The VOIAS profile is as a whole designed to assist the music therapist in clinical practice and the interdisciplinary collaboration, and to provide documentation for a treatment based on therapy related voice work within a music therapy setting.

10.5.1 VOIAS in daily practice within music therapy settings

As described earlier VOIAS is a voice assessment protocol including three core vocal exercises to collect data, VOIAS-1 and VOIAS-2 including the scoring and measurement of selected vocal parameters, and finally a psychological interpretation of the scoring and measurements. The voice assessment protocol to collect data was discussed earlier and it was concluded that this part was not considered difficult to learn and carry out. As clarified earlier it is not time consuming to employ the three core vocal exercises. All in all it therefore only takes one music therapy session to employ the voice assessment protocol. The research study furthermore showed that it is possible to integrate the vocal assessment protocol as part of daily practice. This indicates that the voice assessment protocol is clinically applicable.

It is my own experience that changes in daily practice and ways of working need convincing reasons and also a special attention and effort. In general it often will be considered time consuming to change and reorganise your way of working. As an assessment tool, VOIAS is new within the music therapy field and in focusing on the human voice. In order to encourage the employment of a new assessment tool like VOIAS as a whole in daily practice it therefore has to be documented that the voice assessment protocol it not time consuming to carry out, and it is evident that it will be beneficial to the client as well as provide quality assurance to the therapy related voice work applied.

The findings in this research study showed that the interreliability in employing VOIAS-1 was significant. The psychological interpretation carried out in chapter 8 revealed and indicated that VOIAS is applicable for clients suffering from depression and has the potential to provide relevant information about the client and the client’s process of treatment. This information has relevance to both the music therapist and the interdisciplinary team. The triangulation supported this clinical and interdisciplinary relevance. However, the VOIAS profile has not been tried out as an integrated part of clinical practice. The findings furthermore indicate that training in employing VOIAS as a whole is necessary. So far I am the only one who has carried out the psychological interpretation and conclusion of the scorings and measurements of the selected vocal parameters. Therefore it must be concluded that VOIAS as a whole is emergent and further research is needed in order to take VOIAS a step further and make it clinically applicable.

10.5.2 VOIAS within an interdisciplinary team

It was found that VOIAS has potential to discover and capture even small movements and changes of the therapeutic process as well as provide a broader description of the person being assessed. This information may have significant value for the interdisciplinary team and collaboration. There is however a need to look further into how this information can be comprehensible to the interdisciplinary team. This addresses the design of a sheet for summing up the VOIAS report. In this study this question has not been addressed specifically except in connection with a few vocal parameters like the spectrum and the formant contours when considering the psychoacoustic approach and analysis.

During my research I have presented my research study outside the music therapy field a couple of times. Both times was at the hospital where I work. Once was on a public research day at the hospital and the second time was for a small group of colleagues at
Psykistiski Depilin. On both these occasions I presented a picture of the voice spectrum and the formant contours in order to illustrate the therapeutic process and the connection of the human voice to depression. The visual presentation of the psychoacoustic calculations of spectrum and formant contours was experienced as comprehensible and as an easy access to understand the implications of depression as well as the improving therapeutic process on the human voice. This indicates that the computation and graphic visualization of some of the parameters may be relevant to include in the VOIAS report.

The follow-up interview of the three independent music therapists showed a need for the report to include both quantitative scores and qualitative descriptions. It is my own clinical experience that the voice assessment profile when applied supports structuring the clinical report. When applied it supports clarifying that the psychological interpretation is based upon evaluating and measuring dynamic features within the human voice, and as such serves to produce empirical evidence supporting the use and effectiveness of music therapy in treatment. In order to take VOIAS a step further and make it clinically applicable within an interdisciplinary team I furthermore find it necessary to involve the interdisciplinary team. This is in order to bridge the music therapy field with the field of the interdisciplinary team according to language, terms and content in the VOIAS report. It should furthermore be taken into consideration that the VOIAS report should aim to present the relevant information in a clear and understandable way also for the client, so the client has an opportunity to respond.

10.5.3 VOIAS implicates training

The use of VOIAS requires a trained music therapist. In order to establish shared scoring conventions and ensure interrater reliability in clinical trials it is important to apply training facilities. The music therapist furthermore must be trained to conduct the assessment protocol and learn to conduct the exercises in an authentic and supportive way without influencing the performance and projection.

The performance of the interpretation calls for more intense training, where the trainee should rate audio samples in a class with others. This will enable discussions and multiple perspectives and support a shared scoring convention. This could be taught through a training programme. It is essential with self-experience in order to completely understand the approach and possible interpretation of the assessment.

With some adjustments of VOIAS-1, and a construction of a simpler version of the psychoacoustic programme based on either the MIR toolbox or the PRAAT, VOIAS will be applicable within a research context involving a larger sample size for a further validation study of VOIAS. Such a research study would then require a formalised training and analysis course for the recruited music therapists in applying VOIAS in daily practice. It is aimed to do so prior to any further investigation of the psychometric properties of VOIAS, which would require more music therapists and more raters as well as more clinical as well as non-clinical samples.

It is not necessarily a limitation that VOIAS needs training. As Wosch and Wigram state: "Almost all therapeutic assessment tools need a form of skill acquisition for their applied use, and any that involve establishing reliable observations, scoring or collecting complex data will inevitably demand practice and experience in their use" (Wosch and Wigram, 2007, pp 315).

Wosch and Wigram furthermore state that there is an urgent need for some professional agreement about models of assessment and evaluation. So far none of the assessment models within music therapy have been systematically tested and validated (Wosch and Wigram 2007). Considering interdisciplinary teamwork it is important to strive towards professional agreement about some assessment models within music therapy and develop some standardized models and norms, and not only develop assessment
profiles fixed to the individual music therapist’s way of working. This is in order to be comparative to other fields and assessment models, and in order to obtain credibility from other professional fields. Within music therapy, more and more clinicians realise that the human voice is a possible choice as a primary instrument for the therapy, but presently there is not any assessment protocol within music therapy which addresses this instrument. The voice assessment protocol in this study including three core vocal exercises has the potential to be a more general assessment model, although the individual music therapist does not approach the therapy work with the method of Psychodynamic Voice Therapy.

10.6 Reflection and discussion of the recruitment of clinical and non-clinical participants

In this study participants were adults (18 - 55 years of age) with a diagnosis of depression. As described in detail in chapter 6 many of the procedures applied in connection with the study were either the same as or not so different from my daily practice and function as a music therapist, and the daily procedures within Psykiatriski Depilin. For the benefit of ensuring better recruitment conditions some aspects regarding the reference procedures could be discussed.

10.6.1 The recruitment of clinical participants

It may be difficult to recruit clients who share the same diagnosis and demographic characteristics when recruiting within the psychiatric hospital. Often the sufferings of the depression are severe, and sometimes the depression covers primary psychiatric sufferings.

As mentioned in chapter 5.6 WHO has found that depression already is the leading cause of lost years of healthy life for women in the 15-44 age groups. Therefore the focus of inclusion criteria covering the working age in this study is relevant. Considerations could however be given to the fact that it is difficult to recruit men. It is however essential that gender should be equally distributed in the participants when studying the tendencies in vocal expression.

It is furthermore a fact that depression generally is more prevalent in women than in men (see chapter 5.6). Within psychiatry the risk for a “double diagnosis” is often higher in men diagnosed with depression.

This complicates the recruitment. Although the four clients in this study all had been seen by either a psychologist or a psychiatrist, and discussed interdisciplinary at conference, it did not uncover that the two men had another primary diagnosis.

In Erkkilä et al’s (2008) study the client group focused on F32 and F33 according to the ICD-10 system, and all the clients were assessed by Mini-SCID, a structured clinical interview for DSM-III-R administered by a clinical expert. SST encourages screening for depression, but according to Peter C. Gotzsche, Professor and Director of Nordic Cochrane Center, Rigshospitalet, a Cochrane overview clarifies that the screening is not sufficient. It is always recommended that the first screening should be followed up by another. This is however rarely done in daily practice because it is time consuming. So the best way will be to incorporate the costs for this, when carrying out a research project.

For the benefit of improving the conditions for recruiting clients who share the same diagnosis and demographic characteristics the exclusion criteria in general could be sharpened up. I did not thoroughly consider the implications of clients who have difficulties in engaging in verbal conversation. In clinical practice it may not cause difficulties if the client does not engage in verbal conversation due to the severity of depression. However, when recruiting participants for a research study it may be considered what may be generalized from a number of cases and consider looking into eventual tendencies in this group according to the phenomenon related to its context.

The reasons for having problems engaging in verbal conversations may be due to underlying psychiatric difficulties or a more primary psychiatric diagnosis. Therefore clients who are not able to engage in verbal conversation should be considered as excluded.
A recruitment of four clients may at first not seem like very much, and it is not the main purpose of the study to explore what could be generalized from a number of cases and discover eventual tendencies in this group according to the phenomenon in its context, the human voice and depression. A larger group then has to be recruited and then it may be beneficial to strengthen the focus of the population even more. Furthermore it needs a representative group of reference. It is however evident that the sample size is dependent on the funding and the time frame (Erkkilä et al. 2008). For an explorative study similar to the one carried out by Erkkilä et al., 85 participants were measured as sufficient. It was estimated that up to 10% of these might drop out during the study, leaving 76 possible cases.

The main purpose of the present study was to explore the possibility of constructing a voice assessment tool, identifying vocal parameters, as well as looking into the interreliability of the scoring of these. For each vocal exercise there were several parameters to score or measure. All in all it ended up with a sample of 85 vocal exercises, and taking into consideration that for each vocal exercise this included several vocal parameters to measure and evaluate, it suddenly became comprehensive and a substantial amount of work to carry out. This was not something which was possible to predict the full implications of before the vocal parameters were selected. But in that way four clients and two non-clients turned out to be sufficient for this study.

At the time for making the inclusion and exclusion criteria I did not have any experience with trained singers and depression. So in order to ensure the possibility of VOIAS to capture change in the measurements of the vocal parameters over time, I excluded trained singers suffering from depression. Still, I ended up discussing a possible client, a very trained vocalist, to be included in my study. The argument for doing so was that I in the first meeting with the client was confident that these worries would not matter. It has been discussed and addressed with scepticism several times at the PhD community if trained singers are able to cover the depression, because they would know how to. In this case the client became an example of the opposite. But again, in research the best result is accomplished by striving towards clients who share the same diagnosis and demographic characteristics, if you only are going to make statistical calculations of the results.

In the treatment practice, medication is often taken at the same time as the client receives psychiatric counseling and psychotherapy. It is however evident that one of the side effects of taking antidepressant is a dry mouth, and this may affect the vocal organ and the human voice. In this study this has not been taken into consideration. Therefore it could be relevant to recruit clients suffering from depression where therapy could serve as a method of choice instead of medication.

Peter C. Gøtzsche, professor and director of Nordic Cochrane Center, Rigshospitalet, Denmark, who presently is discussing and giving hard criticism regarding the conditions of identifying and treating depression in the media, directs the attention towards how intruding the side effects of the antidepressants are, and he addresses that the screening of depression is inadequate (Gøtzsche 2012). Gøtzsche and NICE furthermore describe that recent research shows that antidepressants may not be as effective as previously thought, especially in cases of mild depression and therefore the current NICE guidelines do not recommend using antidepressants, at least initially, for mild depression (Gøtzsche 2012).

It is not without complications to do research as part of daily practice. It is my experience that the research project is easily overruled by other concerns. This goes for both the researcher and the interdisciplinary team, especially when attention of the researcher is divided 50 - 50 between research and daily practice. In my case the recruitment and treatment were so integrated in daily practice that it for a long time was not possible to tell the difference. This confirms how applicable the protocol and treatment are, but they are the exact same reasons which may distract the required overall attention to the research...
study.
In my case I am confident that this is due to how I work, collaborate, engage and organise myself in work, as well as how my colleagues’ work. In order to carry out research projects within an institution there is a need to develop ways in which the research project remains present in the consciousness of the department. In my own case I underestimated the implications of the effort this implied.

Therefore it is my experience that in order to carry out research in a department which to some degree involves the expertise of colleagues, it is my experience that there is a job to do in strengthening the sensation of shared responsibility. Today clinical research is part of daily practice to some degree. In the beginning this will be challenging when the department is not in the habit of integrating research in daily practice. Therefore some effort needs to be put into building a research community and culture which can be supportive.

10.6.2 The recruitment of non-clinical participants
In this study only two non-clinical participants were recruited, one woman and one man. They were recruited in order to illustrate normal voice functioning and to function as a reference for the analysis. However in order to be a valid and reliable reference the non-clinical samples need to be much larger. It is a fact that the voice changes as we get older. Therefore in order to create a valid and reliable benchmark and reference group I furthermore would take age and gender into consideration. The best benchmark and reference group will be to make groups representative of age.

During the process of the research study the considerations presented above were not present in my awareness when planning the recruitment of non-clinical participants. The implications of this were that it came to a point in the process where I had difficulties in seeing the value of integrating the two non-clinical recruited participants in the study. I discussed this dilemma with my supervisor and came to the solution that although there only was one representative non-clinical participant for each gender, it was however the only reference I had to a normal voice function, and this was more important than none at all. This is supported by studying the difference between the client’s and the non-clinical woman and non-clinical man’s spectrum and formant contours of the CoreTone.

10.7 Directions for future research
Taking into consideration that VOIAS is emergent and in the process of becoming clinically applicable there are some obvious directions for future research involving the VOIAS profile.

10.7.1 Strengthening the psychometrics properties of the VOIAS profile
A possible first step for further research could be to strengthen the psychometrics of VOIAS by following up on the construction of the VOIAS profile to make it applicable in clinical practice and within new research projects. Looking into the psychometrics involves two major research tasks: the construction of the instrument, VOIAS, and procedures for measurement, and the development and refinement of theoretical approaches to measurement. This means adjusting the design of VOIAS-1 according to recommendations and conclusions made in chapter 7. With regard to VOIAS-2 it would be to establish an interdisciplinary research collaboration including a music therapist with the human voice and body as a primary instrument in music therapy, and the field of music psychology, in order to validate VOIAS-2 and design a simple psychoacoustic version based on either PRAAT or the MIR toolbox.

In order to investigate the psychometric properties of VOIAS even further it would also require more music therapists and more raters as well as more clinical as well as non-clinical voice samples. This part could be obtained by employing VOIAS within a specific client group of population focus for research.

10.7.2 A benchmark and a reference group
It is evident that in order to strive for a high level of reliability and validity of the VOIAS profile there is a need for a reference group as
a benchmark and point of reference. A reference group provides a standard for how a person experiencing subjective emotional well-being, not vocally trained, would appear by employing VOIAS. Then it will be possible to look into the voice patterns that distinguish a “healthy” person from a person suffering from depression.

Age and gender have to be taken into consideration in order to create a valid and reliable benchmark and reference group. However perhaps other aspects should be considered such as cultural issues. The aim is to have as homogeneous a reference group as possible and have the group match the client group of population as much as possible. Therefore it also would be easier to recruit the reference group when the client group of population is chosen.

10.7.3 Post-natal depression and Psychodynamic Voice Therapy

As mentioned earlier VOIAS-1 will be applicable with some adjustments, and with a construction of a simpler version of the psychoacoustic programme based on either the MIR toolbox or the PRAAT (VOIAS-2) within a research context involving a larger sample size for a further validation study of VOIAS. A first step could be to collaborate with a few other music therapists with special interest in applying therapy related body and voice work in clinical practice. These should then be trained in how to apply the voice assessment protocol to the client population in focus for the research study.

The focus for collecting a larger voice sample size for further validation study of VOIAS could be on a client population of women suffering from postnatal depression. This will offer an opportunity to narrow the variation of depression as a diagnosis. It furthermore would narrow the recruitment only to include women and most likely also in a certain age. Furthermore it is my clinical experience during the last three years that therapy related body and voice work is very relevant to apply to this client group.

For the last three years I have in collaboration with the primary health care system on the Faroe Islands been a pioneer in providing better conditions for women suffering from postnatal depression to receive help. This has included being a consultant for the staff within the primary health care system in how to assure consistency in screening women with EPDS, as well as developing a local stepped-care model that promotes access to different services for women suffering from postnatal depression. Finally, I have designed and carried out group therapy. The group therapy is offered if the postnatal depression is severe, or the mother does not respond to services provided by the primary health care system.

The most common therapies offered are interpersonal psychotherapy (IPT) or cognitive behavioural therapy (CBT). On the Faroe Islands the therapy offered over the years has developed from being a combination of IPT or Mindfulnes-Based Cognitive Therapy and Psychodynamic Voice Therapy (PVT) to almost only being Psychodynamic Voice Therapy.

Furthermore Helen Marwich and Lynne Murray (2009) note that although good tools for screening postnatal depression are available to health-care professionals many episodes of postnatal depression go undetected and untreated. This is particularly unfortunate since evidence suggests that vulnerable women who are unwilling to engage in support services are more likely to have poor outcome for themselves and their infants than similarly vulnerable women who do engage. Thus, they state that increasing professional awareness of the effects of depression on speech qualities may enable the illness.

2) Helen Marwick is a developmental psychologist and psycholinguist with a primary interest in the development and social functions of human communication. She is Co-Director of the National Centre for Autism Studies in the University of Strathclyde, and a lecturer in the department of Childhood and Primary Studies, Faculty of Education, University of Strathclyde.

3) Lynne Murray is Research Professor of Developmental Psychopathology, co-director of the Winnicot Research Unit, University of Reading, as well as an honorary Senior Research Fellow in the Development of Child and Adolescent Psychiatry at the University of Cambridge. Her research focuses on the impact of parental psychiatric disorder on child development, particularly postnatal depression, and the intergenerational transmission of psychopathology.
to be better identified and treated, and point out that this is an important area for future clinical research (Marwich and Murray 2009). Research has found that newborn infants are neurologically predisposed to identifying and responding to contours and rhythms of movements, gestures, and vocalizations in their mother’s gestures, vocal sounds, and facial expressions (Malloch and Trevarthen 2009). Something Stern (2000, 2004) calls affective attunement.

Disturbances in expression of the mother’s voice may be the main ‘discouraging’ factor affecting infant cognitive development. The speech characteristics of depressed mothers have been found to predict poor cognitive functioning in the infant. They are a potential marker for interactive qualities that exert a direct impact on the infant (Marwich and Murray 2009).

Therefore it seems as a logical progression to apply Psychodynamic Voice Therapy to this client group as a treatment. Furthermore, very little research within this client group exists within music therapy. Additionally it could be interesting to focus on the vocal patterns over time in this client group, especially because there are implications for the children’s basic condition for further development if the mother is suffering from postnatal depressions and it is indicated that this include the mothers vocal pattern.

10.7.4 A Randomized controlled trial
It could therefore be interesting to employ VOIAS as a test tool together with EPDS and a screening for well-being. A possible design could be a randomised controlled trial where Cognitive Behavioural Therapy and Psychodynamic Voice Therapy were offered, and then test all participants with the three test tools, VOIAS, EPDS, and a screening for well-being.

The study could be placed in the primary health care system. In the recruitment of the participants the mothers should be assessed for eligibility. Then it could be interesting to test all women with VOIAS, EPDS and WHO-5 before and after being allocated to either “Cognitive Behavioural Therapy” or “Psychodynamic Voice Therapy” intervention.

10.8 The researcher’s voices
In chapter 3.4.1 and chapter 4 I defined and described my basic philosophy and epoché and ideas about how knowledge is gained. In this section I will address the axiology of this in relation to the study. Basically it is my opinion that every study is rooted in the values and beliefs of the researcher. Therefore, as mentioned in chapter 3, it would be an illusion that my basic understanding does not have any influence at all on how I have carried out this study as a whole.

My aim has been to bear the client and the clinical practice in mind during the research study. Implicit in this is the interdisciplinary collaboration. In doing that it also came to a point where I had to acknowledge and incorporate my philosophy and basic understandings into the research study ongoing. It could also be described as a reflexive process constantly bringing forth my stance and considerations into awareness in each case where a method had to be designed and constructed.

The reason why this became the way of approaching this study may be due to the fact that nobody had walked this road before me. The reason could also be due to the fact that my basic understanding is so deeply reflected in my way of working in general that I was not able to do otherwise. In many different situations during this study I have found myself not being able to find answers to the questions by looking into other studies or literature. These situations always made me focus my attention towards the client’s well being, the clinical practice and my own beliefs and basic understandings and experiences. Dialogues with my supervisors and discussions at the PhD community supported me to trust my own way to be the right way.

If therapy related body and voice work is not a part of your daily practice or interest it may not always be easy to follow the impact and considerations necessary to be taken into account. This is also the reason why it became essential to describe and clarify my
clinical approach as a research method. Some understood this road easily. Most often these represented colleagues with a phenomenological approach and phenomenological basic understanding. Others did not understand this road easily and most often these represented a different value and basic understanding of singing. I have found that in the core this always had to do with differences in ontology and epistemology. The consequence has been that I unintentionally have utilized my own subjectivity, my own perspectives, and coloured and shaped many aspects of this study.

I find the reflexive process very important, and it should be an ongoing process, never really ending. It is evident that it is in the interaction that new knowledge and experience always emerge and this will inevitable influence the process further on.

10.8.1 The qualitative elements in the quantitative approach of assessment
Therefore my study also in many ways can be described as similar to a qualitative approach. It is emergent in its process rather than based on determined sequences. The overall design of this study was not based on a specific design or method and then imposed, but rather approached exploratively and composing and applying different methods ad hoc considering what would cause least amount of interference for the client and clinical practice. Therefore the different methods designed and constructed during this research study can also be described as not fully decided from the beginning but emerging through a process of discovery and reflections. Bruscia defines this as "equates designing research to actually doing it" (Bruscia 2005, pp 129).

In chapter 4 and 5 I described the basis of my theoretical foundation for interpreting the outcome of the quantitative analysis in chapter 8. This basis also was visible in my description and understanding of depression as an illness, which was described both from a traditional psychiatric stance and from a phenomenological stance. My philosophy is my companion in all my doings and therefore the findings and discoveries of this study are also inevitably rooted and influenced by my philosophy. This world view, or view on psychiatric problems, health, illness and so on has always guided me in my clinical practice. When looking back at my way of approaching and analysing the psychoacoustic measurements, it is clear that my basic understanding is reflected in my way of approaching the analysis, and I further have an experience of how the outcome of the analysis has nourished the roots of my knowledge.

My experience with the morphological method (see chapter 4.1.3) of carrying out an analysis in four steps is reflected in how the psychoacoustic measurements are approached and understood in this study. In the first step it is believed that you can hear the story of the client in his or her music. This is something which my clinical experience has confirmed also in connection with the human voice and voice work. In teaching situations I have often experienced that the life story of the person vocalising is heard and essential life themes become visible. The second step is the music undergoing a phenomenological description. In this case this is the human sound. Every single movement is described in detail. The third step is to relate this to the life story and process of treatment, and finally this is related to the theoretical foundation.

When looking into the parameters or the exercises and including them or excluding them I have had the story of the client, and the story of the treatment next to me, and asked myself; does this make sense? These choises are based on and are a reflection of my way of working and what has value to me as a music therapist, the axiology of my work. This is also the reason why there is no absolute interpretation of a single vocal parameter. Each single parameter has to be seen in connection with the rest, and then related to the client’s story.

In this study I have been able to relate the clinical process to the process of the voice, and if this does not make sense, something is missing and, as such, information which the interdisciplinary treatment team in collabora-
Looking back at the whole process of this research study I have to say that my understanding of psychiatric problems and how they can be approached has not changed, rather become more subtle. I still believe that voice work is a very specific physical experience, affecting the body as well as an inner psychological experiences and processes. Both the psychological and physiological state of the client are communicated when vocalising. The result of the voice assessment protocol may be seen as highly influenced and a result of my way of working and basic understandings. The final choice of vocal exercises ended up with three core vocal exercises free from semantics and linguistics. Although the consequence was that the voice assessment profile unintentionally ended up being easily connected to my own working method, the three core vocal exercises nevertheless may be considered as being based on more universal and primary vocal sounding.

However, it can be discussed if the voice assessment profile is a general model or actually so connected to my way of working that in order to employ it you need to know and be trained in my working method. Reflecting upon this I do think it is possible to employ the voice assessment protocol, although the music therapist is not trained vocally in the same way as me. The findings indicate that some self-experience is necessary and will support the employment of VOIAS. Therefore I trust that the training in applying VOIAS will provide the necessary knowledge. It is however fundamental that the music therapist recognises the purpose of employing these exercises and is able to integrate these in their own daily practice as discussed in chapter 10.4.

10.8.2 The challenge of balancing different fields in one approach
As described and clarified both in my introduction to this research study (chapter 1) and my clinical approach (chapter 4) I have many years of experience with voice work both clinically, personally and in teaching settings. However, I still would not characterise myself as a singer, but more as one who really appreciates the playing field offered by voice work. This brings up a topic for discussion which I touched briefly in chapter 1 about how to balance different fields within the same approach. In this study many different fields had to be balanced. Psychoacoustics, psychology, the understanding and approach of the human voice, approach and understanding of therapy, and myself as the music therapist I am, just to mention a few. It is my opinion that the different fields which come in play have to be balanced in relation to the purpose of their presence. Therefore it is important to make an effort to be conscious and reflexive about the tradition or ontological stance the music therapist reflects and brings into the research study. As described in chapter 1 Tony Wigram (2000) pointed out that we in our language and way of communicating ourselves may be more “therapists” than “music therapist”, thus having a tendency to forget what our colleagues in the natural science professions regard as our strength; the music. When developing a voice assessment profile the musician/vocalist within the music therapist in this study had to be balanced in the selection of parameters reflecting the human voice and the psychological state of the client. During this study I have found it a challenge to balance what possibilities the psychoacoustic world offered, and the many parameters normally applied when describing and evaluating a singing performance, as well as what has psychological and clinical relevance taking the client and the collaboration with an interdisciplinary team into consideration.

10.8.3 The implications of my relation to my own voice and my role as a music therapist
In this study I have carried out four therapy treatments based on Psychodynamic Voice Therapy. All four clients completed the treatment. I mention this because I am very often asked or introduced to the attitude that it must be difficult applying therapy body and voice work. This is due to the considerations that the human voice is “naked”, and there is a risk for the therapy method to be an intruding way of working. I am confident that my relation to my own voice matters when applying therapy related voice work in...
music therapy. I am not afraid of showing my own voice in exactly the shape, color, condition it has, perfect or less perfect. It does not matter. The therapy related voice and body work is about meeting, allowing, exploring something together, and listening. In other words being authentic and present together. During the many years I have employed therapy body and voice work I have had very few clients who refused to work in this way when I introduced it as a working method. Somehow I have succeeded in bending the body and vocal exercises in a way so the client found it a challenge possible to overcome. However, I also think it has to do with how I never judge a vocal expression, but instead welcome it.

As a child I never heard my mother’s singing voice, and it came to a point where I asked her why she never sang. Then she told me her story about how the music teacher in her high school did not acknowledge her singing voice. When she experienced this rejection she simply decided never to sing again. I then asked my mother please to try to sing, because I could not imagine a person not able to sing, and I had a wish to confirm this attitude and belief to my mother. So she tried, and I have never heard such a strange voice. I was astonished, amazed, and curious, and many questions popped up in that second. It is an experience and story which follows me in my work even today. All sounds have a need to be met and acknowledged.

It is a fact that the most transforming and curative elements in psychotherapy are the experiences of the therapeutic relationship (Stern 2010). The consequence of this is then to train the ability of being subjectively present as myself in a disciplined preparedness in relation to the process and relationship of which I take part (Pedersen 2006). Included in this training is also to be comfortable with my own voice and become conscious about the norm-set related to vocal expression. Furthermore it is about exploring and being conscious about those elements that prohibit my own voice to be free. Put in another way, I must listen to the story of my own voice. And finally, but not least - be curious and explorative about sounds possible to make.

When following the Aalborg programme in training to become a music therapist, the music therapist at a certain point has to describe their musical biography. This could also be recommended when focusing on and choosing voice as a primary instrument within music therapy. My own process in rediscovering the playing field within myself in connection with voice has been influenced by an interest in listening to my own story reflected in the voice.

Another perspective is that the human voice as an instrument has to resonate in you as a music therapist. As described earlier it was a great relief to me when I discovered a space where it was allowed to play with the whole spectrum of sounds - the natural, rough, animal or mechanical like sounds, as well as the more harmonic sounds. It was as if I had rediscovered the playing field within myself. By valuing an aesthetic beauty in all kinds of sounds music therapy can offer clients a playing field for body and voice which can support them in finding ways of freeing their voices, and enable them to sing their Self alive.

This attitude towards the human voice is integrated in the analysis of the vocal parameters in this study. Taking a closer look into the analysis of BC’s CoreTone in chapter 8.4.4. it is shown how the sound, although it is creaky and unstable, can tell an important story when you listen carefully as described in chapter 4.8.

Listening carefully to BC’s sound of the CoreTone, two different sounds are present within the cracked voice, and there is a difference in quality. Put in another way, there are two expressions at the same time. The head voice, which is also mostly sung in the falsetto register, will give the sound a more girlish quality. This part of the voice I would describe with the words bright and light, but with low intensity, which gives an impression of fragility, whereas the chest voice, where this is mostly sung in the modal register, will give an association to a more mature woman.

In this case I had to make a clinical choice,
which quality to work with. My choice was the sound, which is placed in the body, and to support the manifestation of this quality—supporting BC to have a centre feeling within herself and support a grounding sensation. Going a bit further in the interpretation, following my specific approach and understanding of therapy related voice work, the girlish quality will represent the "shadow" of the voice; and therefore a "shadow" of the person in front of me. It should be considered that it may have value for the therapeutic process to support the client in exploring this character or imagery and make it come alive and more present in order to "tell" its story. In such an exploration it is important to support the client to listen to this "story" of his of her voice as described above.

In order to understand both illness and the healing power of sounding/singing the approach, as well as understanding and valuing the aesthetic beauty in all kinds of sounds, is putting aspects affecting the human voice into motion.

All in all the forms of vitality (Stern 2010) therefore play an essential role in therapy related body and voice work. Vitality is a manifestation of life, of being alive (Stern 2010) and Psychodynamic Voice Therapy is about singing yourself alive.

Conclusion
This study was a research into the development of a voice assessment profile (VOIAS). Already a preliminary literature search showed that no such profile within music therapy existed, and only very sparse research within music therapy focusing on and involving the human voice. The development of VOIAS is based on vocal parameters extracted from the literature review and my clinical approach “Psychodynamic Voice Therapy”. The parameters’ relevance is based on clinical practice and the focus of population in this study, clients suffering from depression.

The following summarises the findings of the investigation of two main questions and five sub-questions of this study:

Main research questions:

1. What constitutes a valid and reliable voice assessment tool for clinical music therapy practice?

A valid and reliable voice assessment tool is composed of a manual with clear definitions of the different vocal parameters, and clear guidelines for how each parameter should be assessed. The use of a Likert-scale in the assessment of the different vocal parameters ensures a structured and controlled way of assessing subjective scorings. Selected vocal parameters analysed from a psychoacoustic perspective, VOIAS-2, also provide a valid and reliable way of analysing voice data.

2. Can this voice assessment tool be used to evaluate change over time?

Both VOIAS-1 and VOIAS-2 can be applied in order to evaluate change over time reliably. VOIAS-2 furthermore has the potential to capture small movements and changes even before it is experienced consciously by the client herself/himself or the staff involved.

Sub-questions:

1. How can relevant vocal parameters for a voice assessment tool be identified and operationally defined?

The clinically applicable vocal interventions have to direct the selection of the vocal parameters for constructing the VOIAS profile. Furthermore a proper theoretical as well as practical approach has to inform the voice assessment profile. A study of the pattern of the process of the vocal parameters across the vocal exercises will validate and reveal the reliability of these to provide relevant information for clinical practice and the interdisciplinary team. Each single parameter has to be seen in connection with the rest, and then related to the client’s story. Relevant vocal parameters for a voice assessment tool are identified by persistently asking if each selected parameter gives information relevant for clinical practice.

2. Can inter-rater / assessor agreement be obtained to ascertain consistent outcomes in application?

The statistical calculation demonstrates a very high interrater / assessor agreement for VOIAS-1 as a whole (Correlation is signifi-
In the statistical analysis a significant negative correlation was found between two raters, Rater 4 (the researcher) and Rater 3. The findings indicate that Rater 3 approached the evaluation as a whole differently from the researcher, Rater 1 and Rater 2, and it is indicated that much may be caught up with by some training.

A limitation is that the performance of the interpretation calls for more intense training, where the trainee needs to rate audio samples in a class with others.

4. What are the potentials and limitations of a vocal assessment tool?
The most valid and reliable voice assessment profile is based on three core vocal exercises, the Glissando, the CoreTone and the Vocal Improvisation, all free from semantics and linguistics, being close to universal and primary vocal sounds. Only one music therapy session is required for assessing. The voice assessment protocol, consisting of the three vocal exercises can be applied by other clinicians, even with very little training and instruction.

VOIAS-1 and VOIAS-2 are complementary and consist of clinical relevant vocal parameters, which can evaluate change over time. With some training, VOIAS-1 will be easy to handle. VOIAS-2 has potential to capture small movements and changes as well as to provide a broader description of the person being assessed, which is important information to be reported to the interdisciplinary team. However, the software PRAAT and the MIR toolbox used in VOIAS-2 are not developed for singing. A simple version of a software needs to be developed focusing on the needs of music therapy in assessing the human singing voice.

The vocal parameter “body” needs further development and requires self-experience to support the understanding of the approach. A triangulation indicated that VOIAS as a whole can be a valid tool providing clinical relevant information about the therapeutic process and the client’s state of being. This confirms the relevance of going further with the development of the voice assessment tool and bringing it closer to a standardisation. This was also viewed from the perspective of clinical practice.
“Nothing happens until something moves. When something vibrates, the electrons of the entire universe resonate with it. Everything is connected.”

Albert Einstein
Abstract
This study was a research into the development of a voice assessment profile (VOIAS). Already a preliminary literature search showed that no such profile within music therapy existed, and only very sparse research within music therapy focusing on and involving the human voice. The development of VOIAS is based on vocal parameters extracted from the literature review and my clinical approach “Psychodynamic Voice Therapy”. The parameters’ relevance is based on clinical practice and the focus of population in this study, clients suffering from depression.

The following summarises the findings of the investigation of two main questions and five sub-questions of this study:

Main research questions:
1. What constitutes a valid and reliable voice assessment tool for clinical music therapy practice?

A valid and reliable voice assessment tool is composed of a manual with clear definitions of the different vocal parameters, and clear guidelines for how each parameter should be assessed. The use of a Likert-scale in the assessment of the different vocal parameters ensures a structured and controlled way of assessing subjective scorings. Selected vocal parameters analysed from a psychoacoustic perspective, VOIAS-2, also provide a valid and reliable way of analysing voice data.

2. Can this voice assessment tool be used to evaluate change over time?
Both VOIAS-1 and VOIAS-2 can be applied in order to evaluate change over time reliably. VOIAS-2 furthermore has the potential to capture small movements and changes even before it is experienced consciously by the client herself/himself or the staff involved.

Sub-questions:
1. How can relevant vocal parameters for a voice assessment tool be identified and operationally defined?

The clinical applicable vocal interventions have to direct the selection of the vocal parameters for constructing the VOIAS profile. Furthermore a proper theoretical as well as practical approach has to inform the voice assessment profile. A study of the pattern of the process of the vocal parameters across the vocal exercises will validate and reveal the reliability of these to provide relevant information for clinical practice and the interdisciplinary team. Each single parameter has to be seen in connection with the rest, and then related to the client’s story. Relevant vocal parameters for a voice assessment tool are identified by asking persistently if each selected parameter gives information relevant for clinical practice.

2. Can inter-rater / assessor agreement be obtained to ascertain consistent outcomes in application?
The statistic calculation demonstrates a very high interrater / assessor agreement for VOIAS-1 as a whole (Correlation is significant at the 0.01 level). However, looking more closely into the parameter body, a significant negative correlation between Rater 3 and the researcher is found. Therefore this parameter needs some adjustments if interrater / assessor agreement is to be obtained.

3. What guidelines are necessary for assessors to undertake a systematic and consistent evaluation?
The guidelines should be clear and complete, keeping the information and definition level at an absolute minimum, and aimed at simplicity.
In order to establish shared scoring conventions and ensure interrater reliability in clinical trials it is important to apply training facilities. Furthermore, the performance of the interpretation calls for more intense training, where the trainee rates audio samples in a class with others.

4. What are the potentials and limitations of a vocal assessment tool?
The most valid and reliable voice assessment profile is based on three core vocal exercises, the Glissando, the CoreTone and the Vocal Improvisation, all free from semantics and linguistics, being close to universal and primary vocal sounds. Only one music therapy session is required for assessing. The voice assessment protocol, consisting of the three vocal exercises can be applied by other clinicians, even with very little training and instruction.
VOIAS-1 and VOIAS-2 are complementary and consist of clinical relevant vocal parameters, which can evaluate change over time.
With some training VOIAS-1 will be easy to handle. VOIAS-2 has potential to capture small movements and changes as well as to provide a broader description of the person being assessed, which is important information to be reported to the interdisciplinary team. However, the software PRAAT and the MIRtoolbox used in VOIAS-2 are not developed for singing. A simple version of a software needs to be developed focusing on the needs of music therapy in assessing the human singing voice.
The vocal parameter “body” needs further development and requires self-experience to support the understanding of the approach. In the statistical analysis a significant negative correlation was found between two raters, Rater 4 (the researcher) and Rater 3. The findings indicate that Rater 3 approached the evaluation as a whole differently from the researcher, Rater 1 and Rater 2, and it is indicated that much may be caught up with by some training.
A limitation is that the performance of the interpretation calls for more intense training, where the trainee should rate and discuss audio samples in a class with others.

5. Will the assessment / voice assessment analysis provide valid and reliable data when applied in clinical practice?
The three cores vocal exercises have the potential to capture even small movements and changes as well as broadening the description of the person being assessed. It provides essential information relevant to report to the interdisciplinary team.
A triangulation indicated that VOIAS as a whole can be a valid tool providing clinically relevant information about the therapeutic process and the client’s state of being. This confirms the relevance of going further with the development of the voice assessment tool and bringing it closer to standardization.
This was also viewed from the perspective of clinical practice.

Summary
This study was a research into the development of a voice assessment profile (VOIAS), which is able to document change over time according to the principles of evidence-based practice in a valid and reliable way (Wigram et al. 2002), as well as provide relevant information for clinical music therapy practice and the interdisciplinary teams.
Already a preliminary literature search showed that no such profile within music therapy existed, and only very sparse research within music therapy focusing on and involving the human voice. The impact of this discovery was that I had to construct such a voice assessment profile as well as the procedures around it myself. Therefore the literature review was focused on gathering
information about possible vocal parameters, and selecting and defining these in order to build a quantitative profile for evaluating the human voice in music therapy. Furthermore, I have found it important also to look into clinical literature focusing on the human voice as a primary instrument within music therapy, as well as reviewing very focused studies of the voice in other fields and professions outside music therapy. This review focused on extracting vocal parameters according to the descriptions of focus for listening to the human voice.

The literature review revealed a significant lack of attention towards the human voice within music therapy and at the same time the voice as a possible source for information about effects and emotional states of a client.

The study is an investigation of the following research questions, divided into two main questions and five sub-questions:

Main research questions:
1. What constitutes a valid and reliable voice assessment tool for clinical music therapy practice?
2. Can this voice assessment tool be used to evaluate change over time?

Sub-questions:
1. How can relevant vocal parameters for a voice assessment tool be identified and operationally defined?
2. Can inter-rater / assessor agreement be obtained to ascertain consistent outcomes in application?
3. What guidelines are necessary for assessors to undertake a systematic and consistent evaluation?
4. What are the potentials and limitations of a vocal assessment tool?
5. Will the assessment / voice assessment analysis provide valid and reliable data when applied in clinical practice?

Design and method
In order to answer the research questions this study employed mixed methods including both qualitative and quantitative research methods, and including both fixed and flexible designs (Robson 2002, Creswell and Clark 2011).

A multiple case study is part of evaluating the VOIAS performed to evaluate a voice assessment profile. The focus of population in this study is clients suffering from depression. In this research project the case study utilises an approach of developing a method to observe and collect data and examine the possible evaluation of the human voice as the particular phenomenon in clinical practice. Since the VOIAS is something intended to be useful in clinical practice, it is highly relevant for the empirical basis of the research project to be able to observe how it functions.

As a whole the design of this study can be described as an Emergent sequential exploratory mixed methods design with emphasis placed on the second, quantitative phase. In other words, according to Hanson et al. (2005), an unequal priority of the qualitative and quantitative analysis.

The initial qualitative phase concerns gathering information about possible vocal parameters, and selecting and defining these in order to build a quantitative profile for evaluating the human voice - VOIAS.

The second quantitative phase follows two different mixed methods designs. In both cases the use of mixed methods arose from issues that developed during the process of conducting the research. These were an examination of the potentials and limitations of VOIAS, the psychological interpretation of the measurements outcome and the trustworthiness and relevance of the information for clinical practice as a result of the interpretation (Chapter 9). Therefore a qualitative method was added in both cases because the use of only one method was found to be inadequate in that phase of the study.

The mixed method design examining the first tryout of VOIAS can be described as an
Explorative sequential design with unequal priority given to the quantitative and qualitative analysis. This part of the research is a two-phase mixed methods design. In phase one quantitative data was collected from three independent music therapists evaluating 87 different sound files using VOIAS, and then analysed quantitatively (statistics). This was done in order to examine the inter-rater reliability and to clarify the pattern of the music therapy treatment process over time. This was followed up by phase two, a qualitative phase, containing an interview protocol to collect qualitative data addressing the three music therapists experiences in using the designed profile and manual to evaluate its potentials and limitations. These data underwent a phenomenological based meaning condensation of three follow-up interviews.

The mixed method design examining a psychoacoustic analysis and a psychological interpretation can be described as a sequential transformative design with unequal priority given to the quantitative and qualitative analysis. This mixed methods design utilized a theoretical-based framework - a transformative worldview - to make a psychological interpretation (Phase 2) of the quantitative analysis of data collected in Phase 1.

Finally a concurrent triangulation design was carried out. The triangulation design is a one-phase design where both quantitative and qualitative methods are implemented during the same frame and with equal weight. It involves the concurrent but separate collection and analysis of data, merging the different sets of data during interpretation of results.

Studying the human voice from five different perspectives

By thoroughly reviewing my own working method and daily practice of “Psychodynamic Voice Therapy” and taking into consideration that most often the human voice within the field of music therapy is used for singing song, the following five interventions were selected:

1. An open sounding glissando movement
2. Sounding one note; - the CoreTone
3. Sounding a crescendo and decrescendo on one note; - the CoreToneVolume,
4. A song; - Happy Birthday
5. A vocal improvisation.

These five vocal interventions were composed into a voice assessment protocol applied in the first, seventh and last sessions of a music therapy treatment running over 12 sessions in order to collect clinical voice samples/data from two men and two women suffering from depression. Additionally voice samples from one non-clinical woman and one non-clinical man were collected by carrying out one assessment. All in all 57 clinical voice samples and 10 non-clinical voice samples were collected.

The design and construction of a voice assessment profile - VOIAS

The design and construction of VOIAS was based on the different vocal parameters identified by looking into existing literature and my own approach and working method. The aim was to construct a general model of a voice assessment profile (VOIAS) focusing on the human voice within music therapy, and not fixed to a certain working method. In the selection of the different parameters it was taken into consideration that research reviewed concluded that only a limited number of acoustic cues have been studied. Additionally it was concluded that it was necessary for researchers to reach beyond single measures of the most common voice cues.

The five vocal interventions chosen in order to cover how the human voice generally is employed within music therapy directed the selection of the vocal parameters for constructing the VOIAS profile as a whole. Some parameters were possible to assess and evaluate both subjectively and objectively, whereas others were only possible to approach either subjectively or objectively (psychoacoustically). The VOIAS profile as a whole
therefore consists of both a subjective approach of assessing/evaluating vocal sound samples/vocal data collected, VOIAS-1, and an objective approach, VOIAS-2, a developed manual of how to employ either VOIAS-1 or VOIAS-2.

In the following it will in each single vocal intervention be clarified and summed up which parameters were selected for the subjective approach for assessment and evaluation (VOIAS-1) and which were selected for the psychoacoustic analysis carried out in chapter 8 (VOIAS-2).

Vocal parameters selected for the assessment of the open sounding glissando movement
In summary, the vocal parameters included in VOIAS-1 therefore were as follows:

- pitch range
- ending pitch of the ascending glissando movement and fluency.

In summary, the following four parameters were included in the psychoacoustic analysis undertaken in chapter 8:

- calculating the pitch range
- calculating and comparing maximum pitch reached in the ascending glissando with maximum pitch reached when starting the descending glissando
- the ending of the ascending glissando
- time based analysis of the open sounding glissando movement as a whole, including the duration of sounding and breathing.

Vocal parameters selected for the assessment of the CoreTone and CoreToneVolume
In summary, the vocal parameters included in VOIAS-1 were as follows:

pitch (fundamental frequency), loudness, richness, tension versus breathy, fluctuation and quality (timbre) in relation to a spatial body sensation, either horizontal or vertical.

In summary, the vocal parameters included in the psychoacoustic analysis undertaken in chapter 8 were the following six parameters:

- measuring the starting pitch / mean frequency of the first tone in the song
- spectral centroid
- the intensity - loudness of the song
- the formant contours of the song

Vocal parameters selected for the assessment of the Vocal improvisation
In summary, the vocal parameters included in VOIAS-1 were as follows:

pitch range, mean loudness, mean richness, mean tension versus breathy, flexibility in form and structure, dynamics, fluency and quality (timbre) in relation to a spatial body sensation, either horizontal or vertical.

In summary, the vocal parameters included in the psychoacoustic analysis undertaken in chapter 8 were the following six parameters:

- measuring the fundamental frequency of the first tone in the voice improvisation
- calculating the pitch range in the improvisation
- a time based analysis of the free voice improvisation
- the sounding and breathing durations in the improvisation

Vocal parameters selected for the assessment of the Song
In summary, the vocal parameters included in VOIAS-1 were as follows:

loudness, richness, tension versus breathy, fluctuation and quality (timbre) in relation to a spatial body sensation, either horizontal or vertical.

In summary, the vocal parameters included in the psychoacoustic analysis undertaken in chapter 8 were the following four parameters:

- measuring the starting pitch / mean frequency of the first tone in the song
- spectral centroid
- the intensity - loudness of the song
- the formant contours of the song
- studying the pitch contour of the improvisation
- studying the formant contours of the improvisation

Results from the first tryout of VOIAS-1
Three independent music therapists tried out VOIAS-1 for the first time. They were only provided with a manual and the specific assessment sheets of VOIAS-1 to evaluate the sound samples. Quantitative data were collected from the three independent music therapists using VOIAS-1 in a first tryout for assessing the 87 sound samples collected from two men and two women suffering from depression, and from one non-clinical man and one non-clinical woman. The sound samples from the non-clinical man and non-clinical woman were added three times. An examination of the interrater / assessor agreement, as well as the possibility of VOIAS-1 to evaluate change over time was carried out. In doing so the scorings of the three music therapists and myself were subject to a statistical analysis. In order to evaluate and examine the function of VOIAS-1, as well as its potentials and limitations, a follow up interview was carried out, and a phenomenological based meaning condensation of the three follow-up interviews was carried out.

Results from the statistical examination of VOIAS-1
All data were entered into SPSS for each client at each time-point (first assessment, second assessment, and last assessment) with each individual rater’s scores. The Pearson’s correlation used to measure inter-rater reliability showed that the inter-rater reliability of VOIAS-1 was significant (Correlation was significant at the 0.01 level). This is a promising result. It supports and validates that the next possible step is to carry out a wider test of VOIAS-1 with a larger sample size for a further validation study of VOIAS-1.

A Spearman’s Correlation was run in order to examine the parameter Body closer on the total scores by rater. Spearman’s rank order correlation calculation found a significant negative correlation between Rater 4 (the researcher) and Rater 3. A significant negative correlation between two raters is unusual. It says that the higher one rater scored, the lower the other rater scored it. It could be discussed as to why there was a significant negative correlation, and what this means as a part of this assessment profile.

Each sound samples collected from one non-clinical man and woman added three times. This meant that the assessors evaluated the same sound sample three times without knowing it. When studying each assessor’s own inter reliability towards the same sound sample it turned out that Rater 3 presented the lowest inter reliability evaluating 46 % of the sound samples equally. Rater 3 was also the only rater who evaluated the same sound sample totally differently each time (6 %). This shows a tendency for Rater 3 to approach the evaluation as a whole differently from the researcher, Rater 1 and Rater 2. This could be the explanation as to why there was a significant negative correlation between the researcher and Rater 3.

Finally a Repeated Measures ANOVA was completed using all of the raters’ scores at each of the three time points and between the first and third time points. Bonferoni’s post hoc analysis was completed to determine where any significant changes might have occurred. The analysis of the overall score of all four clients looking into the possibility of VOIAS-1 to evaluate change over time showed that VOIAS-1 has the potential of being able to document significant changes over time. This is also a promising result supporting and validating that VOIAS-1 has the potential to document and validate change over time in the therapeutic process.

Results from an evaluation of the VOIAS-profile: Three qualitative follow-up interviews
All in all VOIAS-1, consisting of a manual and five different assessment sheets was experienced as quite clear and complete, yet to the complex side and time consuming, but not too complex to apply in clinical practice. The results of the follow-up interviews documented a need for minor corrections and adjustments of the VOIAS-1 in order to make the guidelines clear, precise and complete.
Summaries

The follow-up interviews revealed that one vocal parameter, which addressed a spatial body sensation and the quality of the voice, was the most complicated parameter to approach. The follow-up interviews however also revealed that this parameter, the “body” parameter, employed an approach and listening attitude easy to adapt to when modeled and described. The inter-reliability of VOIAS-1 can be ensured by implementing carefully planned training in the method. The importance of self-experience to the vocal parameters is supported by the outcome of the follow-up interviews. This will further support and relative to the understanding and approach of VOIAS-1. Another limitation is that VOIAS-1 is too quantitative and in need of possibly adding subjective descriptions.

VOIAS-1 is basically experienced as a tool for the music therapist. There is agreement among the interviewees that VOIAS-1 will only be relevant for certain client groups; clients with the ability to reflect, adults looking for personal development or out-patients.

It is experienced that VOIAS-1 has potentials for providing data that make change over time evident and visible, as well as providing essential clinical descriptions about the client’s state of being, which have value to the interdisciplinary team, the interdisciplinary collaboration about the treatment and in order to set the diagnosis. It is furthermore experienced that VOIAS-1 has potentials for being applied as a tool for structuring the therapeutic work, as well as encouraging and supporting the client to understand herself/himself better.

Results from a psychoacoustic analysis and a psychological interpretation

The quantitative possibilities of assessment were examined and choices made in selection of psychoacoustic methods. Musical data of two men and two women suffering from depression performing five different vocal exercises were analyzed psychoacoustically, with attention to different vocal parameters extracted and identified by employing either PRAAT or the MIRtoolbox. A theoretical-based framework, a transformative worldview, was utilized to make a psychological interpretation of the psychoacoustic analysis; the psychological interpretation was related to the clinical process of each client. This was done in order to examine the validity and relevance of the vocal exercises and the selected vocal parameters.

In order to evaluate and examine the function and reliability of VOIAS-2 as a whole, the assessment of the therapeutic process was examined across the exercises for each participant.

It was revealed that the most reliable vocal assessment consists of three core exercises, the Glissando, The CoreTone and the Improvisation. A vocal assessment consisting of these three vocal exercises has the potential to capture even small movements and changes as well as broadening the description of the person being assessed. In other words, it can provide relevant and essential information relevant to report to the interdisciplinary team.

There were indications that the CoreTone only captured mood changes. Therefore it can be concluded that it is essential for a vocal assessment to include more than one single exercise, and that the clinical conclusion cannot be based solely on one single vocal exercise. This revealed concrete elements of potentials and limitations of VOIAS-2, which should be considered for further investigation.

Finally, in each case the results of the overall assessment of the therapeutic process were compared with the statistical results of how three independent music therapists and I evaluated the therapeutic process employing VOIAS-1. It was found that the assessment of the overall therapeutic process by employing VOIAS-1 is congruent with the overall conclusion of the assessment of the therapeutic process employing VOIAS-2, the psychoacoustic analysis. This is a promising result indicating that the implementation of VOIAS-1 can be valid and reliable in describing the clinical process and the client’s state of being. Furthermore it was
found that VOIAS-1 and VOIAS-2 are complementary.

Additionally it was found that training is required for a person to carry out a psychoacoustic analysis.

**Results from looking into tendencies according the voice and depression**

The case study design engenders the possibility of considering what may be generalized from a number of cases within the same clinical population as a consequence of evaluation over time by looking into eventual tendencies in this group according to the phenomenon in its context; the human voice and depression. In this research study two men and two women suffering from depression were recruited. The diagnosis of both the men however changed during the treatment. This left two women suffering from depression. The results from the analysis both with VOIAS-1 and VOIAS-2, as well as the clinical report pointed out that the depression decreased over time in both cases.

According to the results above the most reliable vocal assessment consists of three core exercises, the Glissando, The CoreTone and the Improvisation (see table 1). When

<table>
<thead>
<tr>
<th>Vocal parameters</th>
<th>Depression</th>
<th>A decrease of depression</th>
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<tbody>
<tr>
<td>Glissando</td>
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<td>Pitch range</td>
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<td>Maximum ascending pitch vs. maximum descending pitch</td>
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<td>Ending pitch</td>
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<td>Sounding duration</td>
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<td>Breathing duration</td>
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<tr>
<td>CoreTone</td>
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<td>Fundamental frequency</td>
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<td>Spectrum</td>
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<td>Spectral centroid</td>
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<td>Formant contours</td>
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<td>Intensity</td>
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<tr>
<td>Duration of CoreTone</td>
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<td>Improvisation</td>
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<td>Pitch range</td>
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<td>Time bases analysis of Improvisation in total</td>
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<td>Sounding duration</td>
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<td>Breathing duration</td>
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<td>Formant contours</td>
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Table 1: Summary of the vocal parameters selected and identified as being relevant for further research within the population of depression.
looking into these three core vocal exercises, and relating and comparing the pattern of progress over time within the vocal parameters, they in general follow the same tendencies for the two women. The tendencies confirm my clinical experience. It is however not a result with validity. In order to provide validity to the result the sample size is far too small. However, the result indicates that it is worthwhile looking more into the following parameters connected to the three core vocal exercises by recruiting a larger sample of women and men. This is in order to examine if the same tendencies appear in both men and women and to examine if the vocal parameters follow the same tendencies within each gender.

**Results from exploring the pattern of the music therapy process across assessments - a triangulation**

One single case study was then selected in order to carry out a triangulation. The triangulation was carried out in order to validate the VOIAS profile as a whole, and the relevance of taking the development of a voice assessment tool further is also viewed from the perspective of clinical practice. Data and patterns describing the therapeutic process were examined from different perspectives: 1) The clinical description of the music therapy process, 2) AB’s self-experience as illustrated by quotes and drawings and 3) by AB’s evaluation of her Visual Analogue Scale, 4) AB’s scores on the HAM-D scale, and finally 5) by the statistical analysis indicating how three independent music therapists and I measured AB’s therapeutic process in the employment of VOIAS-1.

The description and illustration of the patterns of the therapeutic process are congruent, and this is a promising result indicating that VOIAS can be a valid tool, providing clinically relevant information about the therapeutic process and the client’s state of being. One case triangulation is however not enough to validate the method, but it provides a promising starting point for further research.

The present version of VOIAS enables evaluation and structured observations of the human voice performing three core vocal exercises free from semantics and linguistics. Furthermore the results of the research indicated that the voice assessment protocol is possible to administer in a consistent and stable manner with standard procedures and solid psychometric properties. This moves VOIAS one step closer to standardization.
Dansk resumé

Abstract
I denne afhandling undersøges muligheden for at konstruere et stemmeassessmentredskab (VOIAS). En foreløbig litteraturnemgang viste, at der ikke fandtes et sådan redskab indenfor musikterapi, og at kun lidt forskning indenfor musikterapi fokuserede på og omhandlede den menneskelige stemme. Konstruktionen af VOIAS er baseret på en omhyggelig udvælgelse af stemmeparametre fra litteraturen, samt min behandlingstilgang "Psykodynamisk stemmeterapi", hvis relevans bygger på klinisk praksis og en målgruppe af klienter der lider af depression. I det følgende vil resultaterne for dette studie bliver opsomeret ved en gennemgang af de to hovedspørgsmål og fem delspørgsmål:

Hovedspørgsmål:
1. Hvad konstituerer et validt og pålideligt stemmeassessmentredskab til klinisk musikterapeutisk praksis?


Kan et sådant stemmeassessmentredskab anvendes til at evaluere forandring over tid?
Både VOIAS-1 og VOIAS-2 kan med validitet evaluere forandring over tid. Samtidig har VOIAS-2 potentialet til at indfange små bevægelser og forandringer i stemmen, selv før det opleves bevidst af klienten selv eller af personalet omkring vedkommende.

Delspørgsmål:
1. Hvordan kan relevante stemmeparametre identificeres og beskrives operationelt?
Relevante stemmeparametre kan bedst indentificeres og beskrives operationelt ved at de klinisk relevante stemmeøvelser dirigerer/bestemmer udvælgelsen af stemmeparametrene til at konstruere VOIAS-redskabet, og at en grundig teoretisk såvel som praktisk tilgang underbygger det. Derudover vil en undersøgelse af kendetegn for processen i stemmeparametrene på tværs af stemmeøvelserne kunne validere og afdække, hvordan disse kan bidrage med relevant information til kliniske praksis og det tværfaglige behandlingsteam. Hvert enkelt parameter skal ses i forhold til de øvrige og igen relateres til klientens historie. Udvælgelsen af relevante parametre til en stemmeassessmentredskab sker ved konstant at forholde sig til om parameteret bidrager
med relevant information til klinisk praksis.

Kan der opnås Interraterreliabilitet hvilket sikre ensartede resultater ved anvendelsen af redskabet?

Den statistiske udregning viste en høj Interrater-reliabilitet ved anvendelsen af VOIAs-1. Dog viste det sig ved en nærmere undersøgelse, at der var en negativ korrelation mellem to testpersoner, rater 3 og forskeren ved parameteret "krop". Hvis Interrater reliabilitet/test ensetning skal opnås ved dette parameter er det nødvendigt med egenoplevelse i forhold til parameteret og at parameteret rettes til.

Hvilken vejledning er nødvendig for at bedømmere (testpersoner) kan udføre en systematisk og præcist evaluering?

Vejledningen skal være klar og tydelig, og information og definition skal tilstræbes at være enkelt og holdt på et absolut minimum. Det er nødvendigt at udbyde kurser for at sikre en ensretning i udførelse af scoring og sikre Interrater-reliabilitet. Desuden kræver fortolkningen af scoringen undervisning, hvor den udvønende har mulighed for at lytte til forskellige stemmer, score, evaluere og reflektere over dem sammen med andre.

Hvilke potentialer og begrænsninger har et sådant stemmeassessmentredskab?


Dog er software programmet PRAAT og MIR toolbox, der er anvendt i VOIAs-2, ikke rettet mod en stemme, der synger. Det er nødvendigt at udvikle en mere simpel version af et software, der er baseret på musikterapiets behov i forhold til at teste den menneskelige stemme.

Det er nødvendigt at videreudvikle stemme-parametreten "krop". For at forstå stemme-parametreten "krop" helt, er det nødvendigt med egenoplevelse af parameteret, der kan støtte forståelsen og tilgangen.

Vil en assessment / stemmeassessmentanalyse kunne indhente valide og pålidelige data, når den implementeres i klinisk praksis?

De tre kerne-stemmeøvelser har potential til at indfange selv små bevægelser og forandringer i stemmen og bidrage til en mere nuanceret beskrivelse af personen der bliver testet. Resultatet af analysen indikerer, at disse informationer er relevante at rapportere videre til det tværfaglige behandlingsteam. En triangulering (case study) underbyggede indikationen for at VOIAs i sin helhed kan være et validt redskab til at indhente klinisk relevante informationer om den terapeutiske proces og klientens psyiske tilstand. Dette peger på relevansen af at gå videre med at udvikle stemmeassessmentredskabet og bringe den tættere på en standardisering. Dette var også informanternes vurdering ud fra et klinisk praksisperspektiv.

Resumé

I denne afhandling undersøges det, om det er muligt at konstruere et stemmeassessmentredskab (Voice Assesment Profile – heretter forkortet VOIAs), der kan dokumentere forandring over tid med validitet og reliabilitet, og som bygger på principperne for evidensbaseret praksis (Wigram et al. 2002), og om det vilka VOIAs er muligt at indhente relevante informationer til klinisk musikterapeutisk praksis og til det tværfaglige behandlingsteam.

En foreslåelig litteraturgennemgang viste, at der ikke fandtes et sådant redskab inden for musikterapi, og at kun lidt forskning indenfor

Denne afhandling præsenterer en undersøgelse af følgende forskningsspørsmål, fordelt på to hovedspørgsmål og fem underspørgsmål:

**Hovedspørgsmål:**
1. Hvad konstituerer et validt og pålidelige stemmeassessmentsredskab til klinisk musikterapeutisk praksis?
2. Kan et sådant stemmeassessmentsredskab anvendes til at evaluere forandring over tid?

**Underspørgsmål:**
1. Hvordan kan relevante stemmeparametre identificeres og beskrives operationelt?
2. Kan der opnås interrater-reliabilitet, hvilket sikrer ensartede resultater ved anvendelsen af redskabet?
3. Hvilken vejledning er nødvendig for at bedømme (testpersoner) kan udføre en systematisk og præcis evaluering?
4. Hvilke potentialer og begrænsninger har et sådant stemmeassessmentsredskab?
5. Vil en assessment / stemmeassessmentsanalyse kunne indhente valide og pålidelige data, når den implementeres i klinisk praksis?

**Design og metode**

For at kunne besvare forskningsspørgsmålene er forskningen baseret på et "mixed methods" design, der omfatter både kvalitative og kvantitative forskningsmetoder, med såvel "fixed" som "flexible designs" (Robson 2002, Creswell and Clark 2011).

I evalueringen af en stemmeassessmentsredskab inddrages en multiple case study-design til vurdering af VOIAS. Målgruppen for denne undersøgelse er klienter der lider af depression. I dette forskningsprojekt anvendes "case study" anvendt som en (også klinisk realistisk) tilgang til at udvikle en metode til observation og indsamling af data og til at undersøge muligheden for at evaluere den menneskelige stemme som et særligt fænomen i klinisk praksis. VOIAS er beregnet til implementering i klinisk praksis. Det er derfor højst relevant for det empiriske grundlag for forskningsprojektet at undersøge og observere, hvordan det fungerer i praksis.


Konstruktionen af VOIAS, en kvantitativ profil til evaluering af den menneskelige stemme, består således af et blandet forskningsdesign i to dele. Første del er en kvalitativ del, som via litteraturgennemgangen insamlar og evaluerer informationer om mulige stemmeparametre med henblik på en udvælgelse og definition af disse. Den anden og kvantitative del består af yderligere design baseret på "mixed methods". I disse to tilfælde udsprang anvendelsen af "mixed methods" af et behov for kvalitative vurderinger, som opstod undervejs i forskningsprojektet. Disse omhandlede et behov for at perspektivere
lationspotentialer og begrænsninger. En behov for at inddrage en psykologisk fortolkning af resultaterne, samt en undersøgelse af redskabets validitet, og endelig VOIAS-informationens relevans for klinisk praksis. Derfor blev en kvalitative undersøgelse tilføjet i begge tilfælde, fordi én metode ikke var tilstrækkeligt dækkende i denne fase af undersøgelsen.


Til sidst blev en delundersøgelse i et "concurrent triangulation design" gennemført. Trianguleringen er et et-fase design, hvor både kvantitative og kvalitative metoder er implementeret inden for samme ramme og hvor prioriteten af de to metoder er jævnbyrdig. Undersøgelsen består af en indsamling og analyse af forskellige data, der er indsamlet separat. Resultaterne fra disse sammenholdes.  

2 Undersøgelse af den menneskelige stemme ud fra fem forskellige perspektiver De følgende fem øvelser blev udvalgt ud fra en gennemgang af min egen måde at arbejde på, og ved at jeg forholdt mig til min daglige praksis for "Psykodynamisk stemmeterapi". Desuden blev der inddraget en viden om at den menneskelige stemme i musikterapi i mange tilfælde bliver anvendt til at synge sange:

1. En åben lydliggørelse af en glissando-bevægelse der inkluderer en opadgående- og nedadgående glissando-bevægelse; - Glissando
2. Lydliggørelse af en tone; - CoreTone
3. Lydliggørelse af en crescendo og decrescendo på en tone; - CoreToneVolume
4. En sang; - Happy Birthday
5. En stemme-improvisation.


Designet og konstruktionen af et stemmeassessmentredskab - VOAIS Designet og konstruktionen af VOIAS var baseret på de forskellige stemme parametre,
som blev identificeret ved at studere litteraturen og min egen tilgang og måde at arbejde på. Målet var at konstruere en generel stemmeassessmentredskab (VOIAS) model, der fokuserede på den menneskelige stemme inden for musikterapi, og som ikke var fikseret i en bestemt måde at arbejde med terapirettet stemme på. I udvælgelsen af de forskellige parametre blev det taget med ind i overvejelserne, at gennemgangen af tidligere forskning påpegede, at kun et begrænset antal akustiske parametre var blevet studeret. Samtidig blev det også påpeget, at det var nødvendigt for forskningen at gå videre end til kun at studere og måle på de mest almindelige stemmeparametre.

De fem udvalgte stemmøvelser bestemte valget af stemmeparametre i konstruktionen af VOIAS redskabet i sin helhed. Nogle parametre var mulige at assesse og evaluere både subjektivt og objektivt (psykoakustisk), mens andre kun var mulige at gå til enten subjektivt eller objektivt (psykoakustisk). VOIAS redskabet i sin helhed omfatter derfor både en subjektiv tilgang til at assesse og evaluere stemmeksempler/stemmedata, VOIAS-1, og en objektiv tilgang VOIAS-2. I begge tilfælde er der udviklet en vejledende manual der beskriver, hvordan VOIAS-1 og VOIAS-2 anvendes.

I det følgende vil det i forhold til hver enkelt stemmøvelse blive forklaret og opsummeret, hvilke parametre der blev valgt ud til det subjektive redskab (VOIAS-1) og det objektive redskab (VOIAS-2) og analyse.

Stemmeparametre udvalgt til at en assessment af glissandoøvelsen
VOIAS-1 inkluderer følgende stemmeparametre: toneomfang (pitch range), sluttone (ending pitch) af den opadgående glissando bevægelse og flydende (fluency). VOIAS-2 inkluderer:
- beregning af toneomfang
- beregning og sammenligning af højeste tone opnået i den opadgående glissando med den højeste tone opnået, når den nedadgående glissando bevægelse påbegyndes
- sluttonen af den opadgående glissando
- tidsbaseret analyse af glissando bevægelsen i sin helhed, hvilket inkluderer tidsomfanget af lyd og åndedræt.

Stemmeparametre udvalgt til at en assessment af CoreTone and CoreToneVolume
VOIAS-1 inkluderer følgende stemmeparametre:
- tonen (grundtonefrekvens), volumen, fylde, kompression kontra luftig, tonesikkerhed og klang kvalitet (timbre) i relation til en rummelig kropslig fornemmelse, enten horizontalt eller vertikalt.

VOIAS-2 inkluderer:
- grundtonefrekvens/Hz (pitch)
- spectrum
- spectrum centroid
- formant kurver
- intensitet
- varighed af tonen.

Stemmeparametre udvalgt til at en assessment af en sang - Happy Birthday
VOIAS-1 inkluderer følgende stemmeparametre:
- volumen, fylde, kompression kontra luftig, tonesikkerhed og klang kvalitet (timbre) i relation til en rummelig kropslig fornemmelse, enten horizontalt eller vertikalt.

VOIAS-2 inkluderer:
- beregning af begyndelsestonen i sangen
- spectral centroid
- intensitet af sangen
- formant kurverne af sangen.

Stemmeparametre udvalgt til at en assessment af en stemmeimprovisation
VOIAS-1 inkluderer følgende stemmeparametre:
- toneomfang, gennemsnitlig volumen, gennemsnitlig fylde i stemmen, gennemsnitlig kompression kontra luftig, fleksibility i form and struktur, dynamik, flydende and klangkvalitet (timbre) i relation til en rummelig kropslig fornemmelse, enten horizontalt eller vertikalt.

VOIAS-2 inkluderer:
- beregning af toneomfang anvendt i improvisationen
- en tidsbaseret analyse af stemmeimprovisationen
- tidsomfanget af lyd og åndedræt i stemmeimprovisationen
- studere tone kurven af improvisationen
- studere formant kurverne af improvisationen

Resultater fra det første forsøg med VOIAS-1
Tre musikterapeuter samt forskeren prøvede uafhængigt af hinanden at anvende VOIAS-1 før første gang. De tre musikterapeuter fik udelaveret en manual och assessmentskemaer udarbejdet til at evaluere stemmeeksemplerne på. De kvantitative data i denne de-lundersøgelse var bedømmelserne fra tre musikterapeuter, der anvendte VOIAS-1 til at assesse og evaluere 87 stemmeeksempler indsamlet fra to mænd og to kvinder der led af depression, og fra en ikke-klinisk mand og en ikke-klinisk kvinde.

En statistisk analyse blev lavet af de tre musikterapeuters og min egen scoring. Det blev undersøgt, om der var interrater / assessment overensstemmelse i anvendelsen af VOIAS-1 samt om det var muligt for VOIAS-1 at evaluere forandring over tid. For at kunne evaluere og undersøge VOIAS-1 redskabets funktion, dens potentialer og begrænsninger blev der desuden foretaget et opfølgende interview af de tre musikterapeuter. Disse tre interviews blev analyseret som en fænomenologisk baseret meaningskondensation.

Resultater af den statistiske undersøgelse af VOIAS-1
Alle data blev indført i SPSS for hver enkelt klient fra første, anden og sidste session med hver enkelt assessors scoring. Pearsons korrelation, der blev anvendt til at bedomme interrater reliabiliteten, viste at interrater-reliabiliteten var signifikant (korrelationen var signifikant på et 0.01 level). Dette er et lovende resultat. Det understøtter og validerer at det næste mulige skridt vil være at teste VOIAS-1 med en større gruppe for at validere VOIAS-1 redskabet yderligere.

En Spearman’s korrelationstest blev udført for at undersøge de enkelte rateres scoring af parameteren “krop” mere ingående. Spearman’s rank order correlation test viste en signifikant negativ korrelation mellem Rater 4 (forskeren) og Rater 3. Ved at studere hver enkelt assessors egen interrater reliabilitet i forhold til det samme stemmeeksempel viste det sig, at Rater 3’s tilgang til en stemmeevaluering i det hele taget har en tendens til at afvige fra forskerens, Rater1 og Rater2.

Til sidst blev en Repeated Measures ANOVA gennemført ved at anvende alle assessernes scoringer for hver af de tre assessemtes. En Bonferoni’s post hoc analyse blev gennemført for at vise hvor og hvis der var nogle signifikante forandringer over tid. Denne analyse var vigtigt ift spørgsmålet om VOIAS-1 kunne evaluere forandring over tid, og resultatet var, at VOIAS-1 har potentielle til at dokumentere en signifikant forandring over tid. Dette er også et lovende resultat, der understøtter og validerer at VOIAS-1 har potentielle til at dokumentere og validere forandring over tid i en terapeutisk proces, med fokus på den menneskelige stemme.

Resultaterne af en evaluering af VOIAS redskabet: Tre opfølgende interviews

De opfølgende interviews viste, at mest komplekse parameter at gå til var stemmeparameteret “krop”, som er baseret på en kropslig orientering i forhold til stemmens kvalitet. De opfølgende interviews afdækkede at, at tilgangen til dette parameter var til at forstå, hvis instruktionen inkluderede en egen-oplevelse.

Interrater-reliabiliteten af VOIAS-1 kan styrkes ved at implementere et kort kursus i at anvende VOIAS-1. De opfølgende interviews understreger vigtigheden af egenoplevelse af de forskellige stemmeparametre og stemmøvelser. Dette vil støtte en forståelse af tilgangen i anvendelsen af VOIAS-1. En anden begrænsning er, at VOIAS-1 opleves som ‘for kvantitativ’. Der er et behov for at tilføje en mere kvalitativ tilgang, hvor
det er muligt at tilføje subjektive beskrivelser.

VOIAS-1 er grundlæggende et redskab, der henvender sig til musikterapeuter. Der er enighed mellem de tre musikterapeuter om, at VOIAS-1 kun vil være relevant for en bestemt klientmålgruppe; - klienter med evnen til refleksion, voksne der søger personlig udvikling og ambulante klienter.

Informanterne oplever, at VOIAS-1 har potentielle til at indhente data der kan tydeligt og give evidens til de forandringer der observeres over tid, såvel som at indhente vigtige kliniske beskrivelser af klientens psykiske tilstand, som vil have værdi for det tværfaglige samarbejde omkring behandling. Indikationer pegede på, at CoreTone kun indhentede information om forandring i “mood”, og at denne observation ikke kunne stå alene. Derfor blev konklusionen, at det var vigtigt at inkludere mere end én stemmøvelse, og at den kliniske vurdering ikke kan baseres på en stemmeparameter alene.

Dette afdækkede meget konkrete potentialer og begrænsninger for implementeringen af VOIAS-2, som bør undersøges yderligere.

**Resultaterne af den psychoakustiske analyse og den psykologiske perspektivering.**


For at evaluere og undersøge funktionen og reliabiliteten af VOIAS-2 i sin helhed blev den udførte assessment af den terapeutiske proces undersøgt på tværs af øvelser for hver af klienterne.

Resultat var, at den mest pålidelige stemmalevelse består af en implementering af tre kerne stemmøvelser; - en glissandoøvelse, en CoreTone-øvelse og en stemmeimprovisation. En stemmeevaluation der består af disse tre stemmøvelser har potentielt til at indfange selv små bevægelser og forandringer i stemmen - og dermed bidrage til en mere nuanceret beskrivelse af personen der bliver tester. Med andre ord vil en sådan test kunne bidrage med relevante og informationer, der har betydning for det tværfagligesamarbejde omkring behandling. Indikationer pegede på, at CoreTone kun indhentede information om forandring i “mood”, og at denne observation ikke kunne stå alene. Derfor blev konklusionen, at det var vigtigt at inkludere mere end én stemmøvelse, og at den kliniske vurdering ikke kan baseres på en stemmeparameter alene.

Til sidst blev resultatet af den samlede assessment af den terapeutiske proces sammenholdt med det statistiske resultat af hvordan de tre musikterapeuter og jeg evaluerede den terapeutiske proces ved at anvende VOIAS-1. Her var resultatet, at der var overensstemmelse mellem konklusionen i VOIAS-1 og VOIAS-2s evaluering af den terapeutiske proces. Dette er et lovende resultat, der indikerer at implementeringen af VOIAS-1 kan blive en valid og pålidelig kilde til at beskrive og dokumentere den kliniske proces samt klientens psykiske tilstand. Samtidig er konklusionen, at VOIAS-1 og VOIAS-2 supplerer hinanden.

**Resultatet af at studere tendenserne i stemmen i forhold til depression**

Et case study design muliggør en undersøgelse af, hvad der kan generaliseres udfra en række cases inden for den samme målgruppe, ved at følge evalueringen af stemmen og depressionen over tid og se på eventuelle tendenser ved stemmeudtrykket. I denne undersøgelse blev to mænd og to kvinder, der led af depression, rekrutteret. Imidlertid blev diagnosen for de to mænd ændret i løbet af
behandling. Dermed var der to kvinder tilbage, der led af depression og beholdt diagnosen. I begge tilfælde var resultatet af analysen med både VOIAS-1 og VOIAS-2, samt den kliniske rapport, at depressionen blev mindre over tid.

I forhold til resultatet præsenteret ovenfor, kan en pålidelig stemmeassessement baseres på tre kerne øvelser, glissando-øvelsen, CoreTone-øvelsen og en stemmeimprovisation (se tabel 1). Ved at studere disse tre øvelser og sammenholde det kendetegnende for processen indenfor stemmeparametrene viser det sig, at de generelt følger den samme tendens for de to kvinder. Tendensen er i overensstemmelse med min kliniske erfaring. Det er dog ikke et validt resultat, idet der kræves en langt større gruppe for at kunne validere denne iagttagelse. Resultatet indikerer dog, at det er værd at studere de følgende parametre nærmere ved at rekruttere en større gruppe af mænd og kvinder. Dermed vil det kunne undersøges, om den iagttagede tendens for stemmeparametrene bevægelse gælder for både mænd og kvinder.

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<th>Stemme parametre</th>
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<td>Tidsbaseret analyse af improvisationen i sin helhed</td>
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Tabel 1: Stemmeparametre der er relevante at undersøge med fokus på deres udviklingstendens i relation til en depression og en lettelse af depressionen.
Mønstrene i den musikterapeutiske proces på tværs af assessmentredskaber - en triangulering

En case blev udvalgt til en gennemførelse af en triangulering. Denne triangulering blev gennemført for at bidrage til en validering af VOIAS redskabet i sin helhed, og for at kunne vurdere relevansen af en videreudvikling af stemmeassessmentredskabet i forhold til klinisk praksis.

Data og mønstre der beskriver den terapeutiske proces overordnet blev undersøgt fra følgende perspektiver: 1) Den overordnede kliniske beskrivelse af den musikterapeutiske proces, 2) klientens egenoplevelse illustreret med tegninger og citater knyttet til tegningerne, og 3) inddragelse af klientens egen evaluering på en Visual Analog Skala (VAS), 4) klientens scoring på en depressionstest (Hamilton-D scale), samt 5) ved at sammenholde den statistiske analyse af, hvordan tre musikterapeuter og jeg evaluerede klientens terapeutiske proces ved at anvende VOIAS-1.

Beskrivelsen og illustrationen af mønstret for den terapeutiske proces overordnet var kongruente, og dette er et lovende resultat, der indikerer at VOIAS kan være et validt redskab til indhentning af klinisk relevante informationer om den terapeutiske proces og klientens psykiske tilstand. En case triangulering er dog slet ikke nok til at validere denne assessment metode, men det er et godt udgangspunkt for videre forskning.

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References


Lowen, A. (1975) Bioenergetics. Penguin Compass

Maxwell-Davies, P. Eight Songs for a Mad King Performed by Roy Hart at The Queen Elizabeth Hall, London, 22nd April 1969


References


Appendices

USB-memorystick:
Sanne Storm: Research into the Development of Voice Assessment in Music Therapy - PDF

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Dream of Death - composed and performed by Sainkho Namtchylak
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  From head to chest
  From the middle to the back to the middle

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  BC-Sound files
  DC-Sound files
  BD-Sound files
  Non-clinical-man-Sound files
  Non-clinical-woman-Sound files

Appendix for chapter 8 > Pitch contour of the Improvisation
  The pitch contour of AB’s Improvisation
  The pitch contour of BC’s Improvisation
  The pitch contour of DC’s Improvisation
  The pitch contour of BD’s Improvisation

Appendix for chapter 8 > Formant contour of the Improvisation
  The formant contours of AB’s improvisation
  The formant contours of BC’s improvisation
  The formant contours of DC’s improvisation
  The formant contours of BD’s improvisation
# Observationsskema / Stemme

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APPENDIX 3: A VOCAL ASSESSMENT OF “KAREN” SINGING A SONG

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GLISSANDO:

NASALKLANG / VÆGEN
- NORMAL
- INGEN

DYNAMIK: / VÆGEN
- NORMAL
- INGEN

VOLUMEN:
- $f$f
- $p$p
- $m$p
- $f$f

KOMPRESSION:
- INGEN

TONE SIKKERHED:
- INGEN

SANGREGISTER:

TALEFLÆGE:

KLANGKVALITETER RESONANS:
- FLÖJTE
- CELLO
- TROMPET
- BAS
The procedure for the mandatory grounding exercises

*Based on Psykodynamic Voice Therapy’s basic body and vocal interventions*

1. Opening conversation

2. Start by walking freely around in the space.

3. Change from walking regularly to sliding the feet over the floor like skating (see chapter 4, section 4.5, pp xx).

4. Stopping the movement and placing the client approximately at the same spot in the music therapy room.

5. Find a suitable position for the feet and guide the client to a more standing sensation of grounding (see chapter 4, section 4.5, pp xx-xx).
   a. Place all body weight on the front part of the foot.
   b. Place all body weight on the heel of the foot.
   c. Start a gentle and light movement between the front and the back part of the foot. Imagine a single bulrush being moved by a very gentle wind. Let go of tension in the shoulders. Let the arms hang freely.
   d. Find a centre by narrowing the movement in the feet. Focus on the centre between the two points. Find a centre where there is a sensation of the whole foot at once. Stop the movement here.
   e. Now breathe in deeply through the nose, and start a shaking/rocking motion up and down (vertically) in the knees, while exhaling on the sound of S-s-s-s-s-s-s. This is repeated 3 - 4 times.
   f. Without moving now shake the hips, and the shoulders (a horizontal movement). Make the motion as loose as possible.
   g. Feel the flexibility in the body though the presence of a steady and grounded sensation in the feet.

6. Keep shaking the shoulders gently so the body does not tense up.

7. With closed mouth start making a small glissando movement imagining the taste of a favourite chocolate Mm-m-m-m-m (see chapter 4, section 4.7.1.1, pp xx).

8. Allow the glissando movement to grow in size both up the scale and further down the scale. Exaggerate the movement.

9. In one movement make an ascending glissando as high up the scale as possible with closed mouth sounding Mm-m-m. When reaching the top, open the mouth to an / ah-h-h/ sound, let go of all tension, and start a gentle shaking motion sounding a descending glissando a sigh until reaching the deepest possible note to give sound to (see chapter 4, section 4.7.1.2).

Then the next step is to carry out the five selected interventions.
<table>
<thead>
<tr>
<th>Acoustic cues</th>
<th>Perceived correlate</th>
<th>Definition and measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pitch</strong></td>
<td></td>
<td>F0 represents the rate at which the vocal folds open and close across the glottis. <strong>Acoustically</strong>, F0 is defined as the lowest periodic cycle component of the acoustic waveform, and is extracted by computerized tracking algorithms (Scherer 1982).</td>
</tr>
<tr>
<td>F0 contour (19)*</td>
<td>Pitch contour</td>
<td>Sequence of F0 values across an utterance. Besides changes in pitch, the F0 contour also contains temporal information. The F0 contour is hard to operationalize and most studies report only qualitative classifications (Cowie et al. 2001), the proportion of rising to falling F0 contours (Juslin &amp; Laukka 2001), or the range and gradient of F0 fall at the end of the sentence (Scherer et al. 2003).</td>
</tr>
<tr>
<td>Jitter (13)*</td>
<td>Pitch perturbations</td>
<td>Small-scale perturbations in F0 related to rapid and random fluctuations of the time of the opening and closing of the vocal folds from one vocal cycle to the next. Extracted by various computerized tracking algorithms (Scherer 1989).</td>
</tr>
<tr>
<td><strong>Intensity</strong></td>
<td></td>
<td>Intensity is a measure of energy in the acoustic signal and it reflects the effort required to produce the speech. It is usually measured from the amplitude acoustic wave form. The standard unit used to quantify intensity is a logarithmic transform of the intensity called the decibel (dB) (Scherer 1982).</td>
</tr>
<tr>
<td>Intensity (39)*</td>
<td>Loudness of speech</td>
<td>Intensity is a measure of energy in the acoustic signal and it reflects the effort required to produce the speech. It is usually measured from the amplitude acoustic wave form. The standard unit used to quantify intensity is a logarithmic transform of the intensity called the decibel (dB) (Scherer 1982).</td>
</tr>
<tr>
<td>Attack (2)*</td>
<td>Rapidity of voice onsets</td>
<td>The attack refers to the rise-time or rate of rise of amplitude for voiced speech segments. Usually measured from the amplitude of the acoustic wave form (Scherer 1989).</td>
</tr>
<tr>
<td>Shimmer (−)*</td>
<td>Loudness perturbations</td>
<td>Refers to small regular or irregular variations of amplitude maxima in successive glottal cycles. Extracted by computerized tracking algorithms (Scherer 1989).</td>
</tr>
<tr>
<td><strong>Temporal aspects</strong></td>
<td></td>
<td><strong>Pitch</strong> represents the rate at which the vocal folds open and close across the glottis. <strong>Acoustically</strong>, F0 is defined as the lowest periodic cycle component of the acoustic waveform, and is extracted by computerized tracking algorithms (Scherer 1982).</td>
</tr>
<tr>
<td>Speech rate (41)*</td>
<td>Velocity of speech</td>
<td>The rate can be measured as overall duration or as units per duration (e.g. words per minute). It may include either complete utterances or only the voiced segments of speech (Scherer 1982).</td>
</tr>
<tr>
<td>Pauses (14)*</td>
<td>Amount of silence in speech</td>
<td>Refers to silent periods in an utterance and is usually measured in terms of absence of energy in the acoustic wave form (see Scherer 1982 for a discussion).</td>
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### Table 3.5 Cont’d

<table>
<thead>
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<th>Definition and measurement</th>
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<tr>
<td>Rhythm (5)*</td>
<td>Speech rhythm</td>
<td>There is yet no standardized measure of speech rhythm, but it has been suggested that the degree of regularity versus irregularity of speech may distinguish among positive and negative emotions (Davitz 1964; Juslin &amp; Laukka 2003, Table 7).</td>
</tr>
<tr>
<td>Voice quality</td>
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<tr>
<td>High-frequency energy (24)*</td>
<td>Voice quality</td>
<td>Refers to the relative proportion of total acoustic energy above, versus below, a certain cut-off frequency (e.g. Scherer et al. 1991). As the amount of high-frequency energy in the spectrum increases, the voice sounds more ‘sharp’ and less ‘soft’ (von Bismarck 1974). Obtained by measuring the long-term average spectrum (LTAS), which is the distribution of energy over a range of frequencies, averaged over an extended time period.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Various measures HF 500, HF 1000, spectral slope (linear regression of energy distribution in the frequency band above 1000Hz).</td>
</tr>
<tr>
<td>Formant frequencies (10)*</td>
<td>Voice quality</td>
<td>Refers to frequency regions in which the amplitude of acoustic energy in the speech signal is high, reflecting natural resonances in the vocal tract. The first two formants largely determine vowel quality, whereas the higher formants may be speaker-dependent (Laver 1980). The mean frequency and the width of the spectral band containing significant formant energy are extracted from the acoustic wave form by computerized tracking algorithms (Scherer 1989).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Various measures mean (M) and bandwidth (bw) for F1, F2, F3, and F4.</td>
</tr>
<tr>
<td>Precision of articulation (8)*</td>
<td>Articulatory effort</td>
<td>The vowel quality tends to move towards the formant structure of the neutral schwa vowel (e.g. as in ‘sofa’) under strong emotional arousal (Tolkmitt &amp; Scherer 1987). The precision of articulation can be measured as the deviation of the formant frequencies from the neutral formant frequencies, as reported in various sources. F1 (precision) is most commonly measured.</td>
</tr>
<tr>
<td>Glottal wave form (8)*</td>
<td>Voice quality</td>
<td>The glottal wave form represents the time air is flowing between the vocal folds (abduction and adduction), and the time the glottis is closed, for each vibrational cycle. The shape of the wave form helps to determine the loudness of the sound generated and also its timbre. A ‘jagged’ wave form represents sudden changes in airflow that produce more high frequencies than a ‘soft’ wave form. The glottal wave form can be inferred from the acoustic signal using inverse filtering (Laukkanen et al. 1996).</td>
</tr>
</tbody>
</table>

* This value indicates the number of studies that provided data points for each basic parameter in 104 studies of vocal expression of emotions (Juslin & Laukka 2003) and can be used as a rough index of the relative frequency with which each parameter has been measured previously.

**Note:** Recommended minimum set of voice cues to index level of affective arousal: F0 (floor), F0 (SD), voice intensity (M), speech rate (syllables per minute), and HF 500. Recommended minimum set of voice cues to discriminate different emotions: F0 (floor), F0 (SD), F0 contour (up/down), jitter, voice intensity (M, SD), speech rate (syllables per minute), pauses (Pd), rhythmic regularity, HF 500, and F1 (M, precision).
Moses first attempt of voice analysis compared favorably with the outcome of the Rorschach test.

Emotional Reactivity

V: Fearfulness, cowardice, sensitivity recognized as dominant factors. Lacking in whole-hearted enthusiasm.

R-1: Great tension arises from conflict between opposing tendencies (see below under Direction of Emotional Adjustments). A labile affectivity is shown, with a stabilizing factor in his strong inner life and his superior intellectual interests; through these he is able to hide his conflicts from general public view. He is irritable, however, and has great difficulty in making an effortless and satisfactory adjustment.

R-2: Inadequacy feelings. Imbalance and instability are shown in the expression of affective energy.

Direction of Emotional Adjustments

V: Autistic, schizoid, egocentric. A sadistic component is also noted, with infantile destructiveness. Self-consciousness, rigidity. Schizoid tendencies are confirmed by an epileptic-like speech melody, and a desire to avoid emotionally provocative situations.

R-1: Inhibitory tendencies are in conflict with a tendency to “let go.” He hesitates between an active outgoing attitude and one of submission and resignation.

R-2: Withdrawn behavior, and also a tendency to primitive impulsive outlets. Egocentric. He shows too much fantasy to take unhealthful directions.

Social Relationships

V: Effeminate. He thinks about himself and makes himself the center of his world, playing a self-conscious social role, in expectation of a response from his audience. Histrionic, sometimes pompous. Ambitious in an unsocial way. While appearing to withdraw, he is not solitary but needs people if only to use them as objects for sadistic expression (“to show them up, tease and torment them.”)

R-1: Effeminate. Adapts to environment less by self-control than by cautious cleverness and affectation. Direct emotional relations to environment are less well organized than his “inner life.”

R-2: Social withdrawal.

Intellectual Functions

V: Intelligent and gifted, but not precise in his work. He is autistic in his thinking, with a “dance macabre” of fantastic ideas.

R-1: Superior intelligence. He shows creative imagination and has a productive inner life. His performance, however, is uneven because of the influence of emotional tensions. Underlying conflicts affect his fundamental attitude toward the world and toward his own future.

R-2: Above average intelligence. Shows a generalizing, abstract approach but with a capacity to see detail. Is apt to react uncritically, with a loose control over method which produces bizarre associations.

The conclusions of the vocal analysis were based upon the following classification system:

1. Level of form    good
2. Range            b flat -d
3. Symmetry          fair
4. Basic pitch       b flat
5. Key    d minor
6. Prevalent register (pure) chest
7. Emphasis         indistinct
8. Stress           fair
9. Pathos
10. Speed
11. Pauses between words
12. Melody
13. Uniformity-monotony
14. Respiration
15. Pitch of final syllables
16. Quality
17. Exactness
18. Melisms
19. Loudness
20. Rhythmic prevalence
21. Melodious prevalence
22. Precise speech
23. Individualities
24. Nasal resonance
25. “Glissando”

From these categories the individual was described as follows:

Analysis and Interpretation of Voice Record

This young man has a low voice with a considerable chest register. However, he does not mix his registers, but exhibits a pure chest quality and then “breaks” or switches into an almost pure head register.

Precision: There is hardly one good quality in his utterances. Lapses are shown in reading and story telling, and the pronunciation is careless except when he is self-consciously performing. The connections of words are usually “smeared”, and the total impression from his speech is conveyed by such adjectives as “pasty”, “dirty”, and “sticky”.

Insincerity and fearfulness or cowardice are revealed as dominant factors, through the absence of relation between pitch at the beginning and at the end of sentence. Effeminacy is indicated by a “glissando”, avoiding concentration on one single pitch.

Self-consciousness, awareness of audience: The exaggerated duration of vowels (“Isn’t that straaaaange?”) reveals the expectation of reaction from the listener. It may be noted also that while some accents are overemphasized, there is no genuine support for such emphasis; it is superficial and not confirmed by underlying factors. There is no vocal expression of whole-hearted enthusiasm. His pathos tries to move others to sympathy, but unsuccessfully; the playing with registers is too obvious. The ending pitch of the words and sentences never fits into the melody - hence the impression of what may be called “stickiness”. The content of his speech (a certain pomposity in emphasizing a psychological theme) shows a consciousness of staying in the focus of psychological observation. He very cleverly takes care of satisfying both the testing recorder by a performance, and the psychologist by perviding him with partly honest and partly faked material; he does not realize that his deceptions are a more reliable source of clues, although a less favorable index to his personality characteristics.

Evidences of withdrawal: The speech melody has a tendency to lower into the “lowest depths”. These are like hiding places, and the whole procedure reminds one of withdrawal. There is also a sadistic component suggested by the raising and sudden lowering of the melody.

A certain rigidity, effeminate mannerisms, “not being able to stop”, the course of strange ideas, and a kinship to an epileptic speech melody, indicate that we face in this record a decidedly schizoid character. Inferences as to most probable somatic make-up: aesthetic body structure; eggshaped face; pale complexion; long, narrow hands; moist palms; thin fingers. From the audible respiration we may infer a relatively small chest diameter. The epileptic-like speech melody suggests the possibility of temporary attacks (convulsions) in childhood. The schizoid interpretation is also supported by the course of his thought, which is purely “autistic”, in the sense in which Bleuler uses this term. He thinks about himself and makes himself the center of the world. He is boundlessly sensitive. He is, however, not solitary, for he needs people around, if only to show them up an tease or torment them. The “dance macabre” of his fantastic ideas reveals the symptoms of an infantile destructiveness.

Practical abilities: He is intelligent and gifted, but not precise in his work. He is also ambitious in an unsocial way.
Samtykkeerklæring

Undertegnede ______________________________ tillader hermed
musikterapeut ______________________________ ansat ved Psykiatriski Depilin, Tórshavn,
Færøerne at anvende materiale fra mit forløb i musikterapi, til følgende formål:

Skriftlig information og dokumentation af musikterapien (fx: forskning, artikler) _____
Mundtlig information og dokumentation af musikterapi (fx. foredrag, forelæsninger) _____
Til undervisning af musikterapistuderende ________

Tilladelsen gælder anvendelse af:
1. lydoptagelser
2. tegninger
3. sange og tekster

Musikterapeuten forpligter sig til at sikre fuld anonymitet vedrørende materiale der anvendes.
Oplysninger hvor genkendelse er mulig anvendes ikke.

Undertegnede ______________________________ har til enhver tid ret til at trække denne
tilladelse helt eller delvist tilbage.

Dato: ______________

___________________________________ __________________________________
Musikterapeut Patient

Sanne Storm, Cand. mag. i musikterapi
Psykiatriski Depilin
Landssjúkrahúsið Tórshavn
Færøerne

P10 Psykiatriskt ambulatorium
J.C. Svabosgøta 41-49, 100 Tórshavn,
Tel. (298) 304500  fax312680
### Table 1-1. 100 Word-Descriptors for Voice

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Musical descriptors

*accent:*
*agitato: agitated*
*amore: love amoroso: loving*

dolce: sweet, soft

*energico: energetic*
*espressivo: expressive*

*forte: kraftigt*
*fortissimo: meget kraftigt*

giocoso: playful, merry
*grave: very slow, solemn*
*grazioso: graceful*

*legato: smoothly*
*lento: slow*
*leggero: light, nimble*

*maestoso: majestic*
*mesto: sad*
*mezzoforte: moderate loud*
*mezzo piano: moderately quiet*

*piano: quiet*
*pianissimo: very quiet*
*pesante: heavy*

*risoluto: bold, strong*

*sforzando, sf, s.fz: forced, accented*
*staccato: detached*

*triste: sad, sorrowful*

*vivace, vivo: lively*
### Descriptor sheet

<table>
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The Manual for VOIAS-1

The subjective analysis of a vocal glissando.

Definition of glissando:
A glissando can be described as a sliding or stretching motion, where musical notes are not fixed. When you sound in a glissando you slide in and out of each pitch so it is impossible to hear where one pitch starts and another one ends. It could also be described as a physical basis of legato - a smooth, flowing motion without breaks between the notes.

In this study the client is sounding in both an ascending and descending glissando with the vowel /ah-h-h/ as in the word “car” or “farther”.

Description of the exercise:
The glissando movement is divided in two. The client starts by sounding in an ascending movement from the lowest possible note she/he can sing the sound /ah/, and then slide as fluently as possible all the way up to the highest possible note she/he can reach in sound. Then the client is instructed to breath in deeply, and to start a descending glissando movement from the highest possible note she/he can sing the sound /ah/ and then slide all the way down sounding in an /ah-h-h/ in a sighing style. At the same time she/he places the body in a gentle shaking motion horizontally until she/he has reached the lowest possible note she/he can give sound to, and then she/he slides all the way down sounding in an /ah-h-h/ in a sighing style. At this point the client’s whole torso is bent forward and downward as relaxed as possible, letting go of all the tensions in the lower part of the back, the shoulders and the neck.

Movement and imagery connected to the motion of sound:
To support this ascending and descending glissando movement, I ask the client to focus on an experience of something heavy to carry or a burden; something which she/he wants to get rid of or throw away. I instruct the client to imagine that she/he lifts up this heavy burden from the floor with her/his hands. When she/he reaches the chest area, she/he tightly clinches the fists, as if squeezing the heavy burden into a compact consistence of a ball. This imaginative ball she/he moves up high over her/his head, while turning the fists. Then in preparing to throw the heavy burden far away the fists are gathered - almost touching each other back to back over the head - pulling all possible energy, and then intentionally throw it away from her/him and her/his body, while opening the hands and letting go of the imagined ball of heavy burden, while emptying the lungs for air.

While still with the hands in the air I instruct the client to turn around her/his open hands as if she/he is going to receive something, which is good for her/him. Simultaneously she/he breaths in deeply, and starts a descending glissando movement from the highest possible note the client can give sound to, and then she/he slides all the way down sounding in an /ah-h-h/ in a sighing style. At the same point where there is no sound but the sound of breath. At this point the client’s whole torso is bent forward and downward as relaxed as possible, letting go of all the tensions in the lower part of the back, the shoulders and the neck.

To support upper explanation watch the reference video of the “Glissando”.

1. Analysis of Parameter 1: Calculating the pitch range.
Method of analysis of the pitch range.
To calculate the client’s pitch range it is necessary to record the lowest and highest pitch the client gives sound to both in the ascending and descending glissando movement.

The ascending glissando.
Listen to the sound file, and match the pitch on the piano where the client begins the ascending glissando, as well as the highest pitch the client can reach in the ascending glissando movement. Record with a cross on the figure of the piano-keyboard in the assessment profile where the client begins the ascending glissando, and record the highest pitch reached in the ascending glissando movement also with a cross on the figure.

The descending glissando.
Listen to the sound file, and match the pitch where the client begins and ends the descending glissando. Record with a cross on the figure of the piano-keyboard in the assessment profile where the client begins and ends the descending glissando movement.

The instruction for the exercise is to let go of the “heavy burden” - the ascending glissando - when the client reaches the highest possible note they can sing.

Method of analysis of the ending ascending glissando.
To calculate the client’s ending pitch on the ascending glissando it is necessary to record on which pitch the ascending glissando ends.

Listen to the sound file, and match the ending pitch the client gives sound to with a pitch played on the piano.
Record with a cross on the figure of the piano-keyboard in the assessment profile where the client ends the ascending glissando.

The client is asked to give sound to the ascending and descending glissando as fluently as possible.

Method of analysis of fluency of the glissando movement.
Listen to the sound file and measure how smooth and fluent the client gives sound to the glissando as a whole according to the following gradients:
5. Very fluent. With very few holes or cracks.
4. Not at all fluent. Abrupt or stepwise glissando. A lot of or big holes and cracks further to the changes of register.
3. Quite fluent. Some holes and cracks, but they are connected to the transition between the lower and higher register.
2. Not at all fluent. Abrupt or stepwise glissando. A lot of or big holes and cracks further to the changes of register.
1. Not at all fluent. Abrupt or stepwise glissando. A lot of or big holes and cracks further to the changes of register.

Record the measurement of the fluency with a cross in the Likert-scale of fluency in the assessment profile.

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The subjective analysis of the CoreTone.

Definition of the CoreTone: The CoreTone is about giving sound to a single note. It is not a spontaneously chosen pitch for this note, but a pitch found following the instructions of the music therapist. These instructions are described below, and as you see the single note grows out of the here and now.

The sound of the CoreTone includes a sustained /ah-h-h/-sound, - a vowel pronounced as in the word “farther” or “car”, at a comfortable pitch and loudness level. This will most often be the middle-frequency - the “loose string” where the vocal instrument is most relaxed. The CoreTone is not a fixed pitch. It will change according to mood, energy or state of being. In other words the CoreTone is a dynamic phenomenon.

Description of the exercise: To support above explanation watch the reference video of the “CoreTone”.

The client is instructed to place one hand on top of the other covering the chest bone. Then the client is asked to imagine that when she/he is going to give sound to the CoreTone she/he is sounding from the chest area covered by the hands. The client is also told that while giving sound she/he might sense the vibration of the sound in her/his hands.

Then the client is instructed to talk about something. It can be anything. It can be about the weather or about how she/he now is going to find her/his CoreTone for this present moment.

While talking the client is asked to listen very closely to the melody of her/his speech. The speech is kind of circling around one single note. The client can come closer to the pitch of this note - the CoreTone - by sustaining different vowels a little longer in the speech. Then finally the vowel comes out as a note sounding at a comfortable loudness level in the form of the sound /ah-h-h-h/- as in the word “car” or “farther”.

1. Analysis of Parameter 1: Measuring the pitch of the CoreTone.

Method of analysis of the pitch of the CoreTone.

Listen to the sound file, and match the pitch sounded by the client with a pitch played on the piano. Record the measured pitch on the figured piano-keyboard: 1. Measuring pitch in the assessment profile with a cross.

2. Analysis of Parameter 2: Measuring the loudness of the CoreTone.

The voice can sound at different levels of loudness. It can sound like almost a whisper or very loud.

Method of measuring the loudness of the CoreTone.

Listen to the sound file and measure the loudness of the CoreTone. The measured loudness in the form of the sound /ah-h-h-h/- is most relaxed. The CoreTone is not a fixed pitch. It will change according to mood, energy or state of being. In other words the CoreTone is a dynamic phenomenon.

Listening to the reference video of the “CoreTone”.

Record the loudness level in the form of the sound /ah-h-h-h/- as in the word “car” or “farther”.

3: Analysis of parameter 3: Measuring the richness in the sound of the CoreTone.

A voice can be more or less rich on overtones. It is the amount of overtones that partly determines how rich or full the voice sounds. The more overtones, the more rich a voice, the more full the voice resonates. When lacking resonance and overtones the quality of the voice sounds thin and flat.

Method for measuring the richness in the sound quality of the CoreTone.

Listen to the sound file of the CoreTone and measure the richness according to the following scale:

5. Very full / rich
4. Full / rich
3. Rich / full
2. Very full / rich
1. Very flat / thin

Record the measurement of richness with a cross in the pictured Likert-scale: 3. Richness in the assessment profile.

4. Analysis of Parameter 4: Measuring grade of tension vs. breath in the sound of the CoreTone.

The sound of the CoreTone can be breathy or tense. If the sound is breathy there is an audible air escaping during soundgiving. The voice lacks clarity and is usually reduced in loudness.

If the sound is tense there is a “hard edge” to the sound, or it can even sound creaky or harsh. A modal voice is a voice where air and pressure are balanced and produce a free clear sound.

Method of measuring the grade of tension vs. breath in the sound of the CoreTone.

The measured grade of tension vs. breath in the sound of the CoreTone. The sound of the CoreTone can be breathy or tense. If the sound is breathy there is an audible air escaping during soundgiving. The voice lacks clarity and is usually reduced in loudness.

If the sound is tense there is a “hard edge” to the sound, or it can even sound creaky or harsh. A modal voice is a voice where air and pressure are balanced and produce a free clear sound.

Method of measuring the grade of tension vs. breath in the sound of the CoreTone.
Listen to the sound file of the Core Tone and measure how tense or breathy the sound of the Core Tone is according to the following scale:

5. Very tense, pressed voice
4.
3. Modal voice.
2.
1. Very breathy voice

Record the measurement of tension vs. breath with a cross in the Likert-scale: 4. Tense / Breathy in the assessment profile.

5. Analysis of Parameter 5: Measuring the fluctuation of the Core Tone.
The pitch of the voice sustains more or less constancy in a given time. Measuring the fluctuation is a measurement of how consistent, or constantly varied and unstable the pitch is sounds.

Method of analysis of the fluctuation of the Core Tone.
Listen to the sound file of the Core Tone and measure where the note is placed in the body according to the following scale:

Front of the body
Head Centred in the body
Back of the body
Front of the body
Throat Centred in the body
Back of the body
Front of the body
Chest Centred in the body
Back of the body

Record the measurement of fluctuation with a cross in the Likert-scale: 5. Fluctuation in the assessment profile.

6. Analysis of Parameter 6: Measuring the sound quality of the Core Tone in relation to a spatial body sensation. Depending on what quality the voice has, the resonance can be experienced at different places in the body. In this measurement the focus is especially on the head, the throat and the chest, a vertical measurement.

Further to a vertical experience there can be a sensation of an outward direction, or an inward direction as a horizontal experience. This quality can either be experienced as emerging from the front or the back of body, or it can be experienced as centred in the middle of the body where it is balanced between the quality of the front and the back.

To support upper explanation listen to the two reference sound files: CoreToneHorizontal - the horizontal movement starting sounding an /ah/ sound in the middle of the body, moving to the back, and then back to the middle, and from the middle to the front, and back to the middle of the body.

CoreToneVertical - The vertical movement starting sounding an /ah/ sound in the chest moving to the head and back to the chest.

Method for measuring the sound quality of the Core Tone.
Listen to the sound file of the Core Tone and measure where the note is placed in the body according to the following scale:

Front of the body
Head Centred in the body
Back of the body
Front of the body
Throat Centred in the body
Back of the body
Front of the body
Chest Centred in the body
Back of the body

Record the measurement of the sound quality of the CoreTone with a cross in the Likert-scale: 6. Body in the assessment profile.

The subjective analysis of the CoreToneVolume.

Definition of the CoreToneVolume.
The following exercise is an extended version of sounding the CoreTone, but the focus is on doing a crescendo and decrescendo in one breath. The crescendo starts as silent as possible reaching a loudness level which feels comfortable and then turning into a decrescendo of the CoreTone ending with silence. All in one breath.

Description of the exercise:
As in sounding the CoreTone the hands are placed above the chest bone, but in this exercise the client is instructed to think about the hands movement as connected to the loudness level of the CoreTone. The more distance to the chest, the louder the CoreTone is sounding. The client is instructed to start sounding the CoreTone as silently as possible, and to allow the CoreTone to gradually grow in volume - getting louder - till reaching a loudness level, which feels comfortable. Then gradually getting softer again, ending the sound of the CoreTone by having both hands placed above the chest bone. Home - out - home. All in one breath.

To support upper explanation watch reference video of the “CoreToneVolume”.

1. Analysis of Parameter 1: Measuring the pitch of the CoreToneVolume.
Method of analysis of the pitch of the CoreToneVolume.
Listen to the sound file, and match the pitch sounded by the client with a pitch played on the piano. Record the measured pitch on the figured piano-keyboard: 1. Measuring pitch in the assessment profile with a cross.

2. Analysis of Parameter 2: Measuring the loudness of the CoreToneVolume.
The voice can sound at different levels of loudness. It can sound like almost a whisper or very loud.
Method of measuring the loudness of the CoreToneVolume.
Listen to the sound file and measure the loudness of the client’s CoreToneVolume according to the following scale:

5. f: Forte. - Loud / strong - Speaking loud.
4. mf: Mezzo-forte - Moderate loud
Louder than speaking
3. mp: Mezzo-piano - Moderate soft - Similar to the speaking voice.
2. p: Piano - Soft - Softer than speaking voice.

Record the measurement of the loudness with a cross in the pictured Likert-scale: 2. Loudness in the assessment profile.

3. Analysis of parameter 3: Measuring the richness in the sound of the CoreToneVolume.
A voice can be more or less rich on overtones. It is the amount of overtones that partly determines how rich or full the voice sound. The more overtones, the richer a voice, the more full the voice resonates. When lacking of resonance and overtones the quality of the voice sounds thin and flat.

Method for measuring the richness of the sound quality of the CoreToneVolume.
Listen to the sound file of the CoreToneVolume and measure the richness according to the following scale:

5. Very full / rich
4.
3. Full / rich
2.
1. Very flat / thin

Record the measurement of richness with a cross in the Likert-scale: 3. Richness in the assessment profile.

4. Analysis of Parameter 4: Measuring grade of tension vs. breath in the sound of the CoreToneVolume.
The sound of the CoreToneVolume can be breathy or tense. If the sound is breathy there is an audible air escaping during soundgiving. The voice lacks clarity and is usually reduced in loudness. If the sound is tense there is a “hard edge” to the sound, or it can even sound creaky or harsh. A modal voice is a voice where air and pressure are balanced and produce a free clear sound.

Method of measuring the grade of tension vs. breath in the sound of the CoreToneVolume.
Listen to the sound file of the CoreToneVolume and measure how tense or breathy the sound of the CoreToneVolume is according to the following scale:

5. Very tense, pressed voice
4.
3. Modal voice.
2.
1. Very breathy voice

Record the measurement of tension vs. breath with a cross in the Likert-scale: 4. Tense / Breathy in the assessment profile.

5. Analysis of Parameter 5: Measuring the fluctuation of the CoreToneVolume.
The pitch of the voice sustains more or less constancy in a given time. Measuring the fluctuation is a measurement of how consistent, or constantly varied and unstable the pitch sounds.

Method of measuring the fluctuation of the CoreToneVolume.
Listen to the sound file of the CoreToneVolume and measure the fluctuation of the sound of the CoreToneVolume in relation to a spatial body sensation.
Depending on what quality the voice has, the resonance can be experienced at different places in the body. In this measurement the focus is especially on the head, the throat and the chest, a vertical measurement.
Further to a vertical experience there can be a sensation of an outward direction, or an inward direction as a horizontal experience. This quality can either be experienced as emerging from the front or the back of body, or it can be experienced as centred in the middle of the body where it is balanced between the quality of the front and the back.

To support above explanation listen to the two reference sound files:
CoreToneVolumeHorizontal - The horizontal movement starting sounding an /ah/ sound in the middle of the body, moving to the back, and then back to the middle, and from the middle to the front, and back to the middle of the body.
CoreToneVolumeVertical - The vertical movement starting sounding an /ah/ sound in the chest moving to the head and back to the chest.

Method for measuring the sound quality of the CoreToneVolume.
Listen to the sound file of the CoreToneVolume and measure where the note is placed in the body according to the following scale:

Front of the body
Head Centred in the body
Back of the body
Front of the body
The subjective analysis of the song “Happy Birthday”.

Definition of the exercise:
This exercise is about singing a well-known song - “Tillukku til tin” (Happy birthday).

Description of the exercise:
The client is instructed freely to choose singing the song with or without the words, and to sing in a pitch and loudness level she/he finds comfortable.

1. Analysis of Parameter 1:
Measuring the loudness of the voice singing the song.
The voice can sound in different levels of loudness. It can sound like almost a whisper or very loud.

Method of measuring the loudness of the voice.
Listen to the sound file and measure the loudness of the client’s voice according to the following scale:
5. f: Forte. - Loud / strong - Speaking loud.
4. mf: Mezzo-forte - Moderate loud Louder than speaking
3. mp: Mezzo-piano - Moderate soft - Similar to the speaking voice.
2. p: Piano - Soft - Softer than speaking voice.

Record the measurement of the loudness with a cross in the Likert-scale: 1. Loudness in the assessment profile.

2: Analysis of parameter 2:
Measuring the richness of the voice.
A voice can be more or less rich on overtones. It is the amount of overtones that partly determines how rich or full the voice sounds. The more overtones, the richer a voice, the more full the voice resonates. When lacking resonance and overtones the quality of the voice sounds thin and flat.

Method for measuring the richness of the sound quality of the CoreTone.
Listen to the sound file of the CoreTone and measure the richness according to the following scale:
5. Very full / rich
4. Full / rich
3. Modal voice.
2. Very flat / thin
1. Very breathy voice

Record the measurement of richness with a cross in the Likert-scale: 2. Richness in the assessment profile.

3. Analysis of Parameter 3:
Measuring grade of tension vs. breath in the sound of the CoreTone.
The sound of the CoreTone can be breathy or tense. If the sound is breathy there is an audible air escaping during soundgiving. The voice lacks clarity and is usually reduced in loudness. If the sound is tense there is a “hard edge” to the sound, or it can even sound creaky or harsh. A modal voice is a voice where air and pressure are balanced and produce a free clear sound.

Method of measuring the grade of tension vs. breath in the sound of the CoreTone.
Listen to the sound file of the CoreTone and measure how tense or breathy the sound of the CoreTone is according to the following scale:
5. Very tense, pressed voice
4. Modal voice.
3. Very breathy voice
2. Very breathy voice
1. Very breathy voice

Record the measurement of tension vs. breath with a cross in the Likert-scale: 3. Tense / Breathy in the assessment profile.

4. Analysis of Parameter 4:
Measuring the fluctuation of the voice.
The pitch of the voice sustains more or less constancy in a given time. Measuring the fluctuation is a measurement of how consistent, or constantly varied and unstable the pitch sounds.

Method of analysis of the fluctuation of the CoreTone.
Listen to the sound file of the CoreTone and measure how consistent or unstable the pitch is sounding according to the following scale:
5. Very consistent and stable
4. Consistent and stable
3. Constantly varied and unstable
2. Consistent and stable
1. Constantly varied and unstable.

Record the measurement of fluctuation with a cross in the Likert-scale: 4. Fluctuation in the assessment profile.

5. Analysis of Parameter 5:
Measuring the voice quality of the song according to body.
Depending on what quality the voice has, the resonance can be experienced at different places in the body. In this measurement the focus is especially on the head, the throat and the chest, a vertical measurement.

Further to a vertical experience there can be a sensation of an outward direction, or an inward direction as a horizontal experience. This quality can either be experienced as emerging from the front or the back of body, or it can be experienced as centred in the middle of the body where it is
balanced between the quality of
the front and the back.
To support upper explanation it
can be a help to listen to the two
reference sound files linked to the
vocal exercise CoreTone.

To support above explanation
listen to the two reference sound
files:
CoreToneHorizontal - the
horizontal movement starting
sounding an /ah/ sound in the
middle of the body, moving to the
back, and then back to the middle,
and from the middle to the front,
and back to the middle of the
body.
CoreToneVertical - The vertical
movement starting sounding an /ah/
sound in the chest moving to the
head and back to the chest.

*Method for measuring the sound*
*quality of the CoreTone.*
Listen to the sound file of the
CoreTone and measure where the
note is placed in the body
according to the following scale:

<table>
<thead>
<tr>
<th>Body</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front of the body</td>
<td></td>
</tr>
<tr>
<td>Head</td>
<td>Centred in the body</td>
</tr>
<tr>
<td>Back of the body</td>
<td></td>
</tr>
<tr>
<td>Throat</td>
<td>Centred in the body</td>
</tr>
<tr>
<td>Front of the body</td>
<td></td>
</tr>
<tr>
<td>Chest</td>
<td>Centred in the body</td>
</tr>
<tr>
<td>Back of the body</td>
<td></td>
</tr>
</tbody>
</table>

Record the measurement of the
sound quality of the CoreTone
with a cross in the Likert-scale: 5.
Body in the assessment profile.

The subjective analysis of a
voice improvisation (IMP).

**Definition:**
The voice improvisation is a free
improvisation where the client is
allowed to “let go” and play
vocally. The voice improvisation is
a state of not being bounded to any
musical rules or themes.

**Description of the exercise:**
To support the client to “let go” or
play vocally she/he is instructed to
imagine a space, a private space
she/he finds very comfortable, and
where the client is doing something
she/he enjoys very much.
The client is then instructed to
allow her/his own melody to grow
out of the sensation of this state.
The client is allowed to move
around in the room of the music
therapy clinic to support this
sensation.
The client is also permitted to start
by giving sound to the CoreTone
and then allowing the melody to
grow out of this one note.
The client decides her/himself for
how long she/he will improvise.

**1: Analysis of Parameter 1:**
**Measuring the pitch range in the
improvisation.**
The voice improvisation can span
several pitches or even octaves or it
can span very few pitches and be
reduced or narrowed in range.
This measurement is about
measuring how much the span of
the voice improvisation is.
A very wide pitch range includes
all the tones from the highest tone
a person can emit to the lowest,
regardless of the nature or quality
of the tone, and span of more than
three octaves. A wide - expanded
or extended phonation range span
of one - two octaves.
A very narrowed - reduced or small
pitch range is a continuing sound
that changes very little in pitches.
A maximum of three notes.

**Method of analysis of the pitch
range in the improvisation:**
Listen to the sound file and
measure the span of the pitch
range of the client’s improvisation
according to the following scale:

- Very extended
- Wide - Expanded - Extended
- Very narrow - Very reduced -
Very small

Record the measurement of the
pitch range of the improvisation
with a cross in the Likert-scale: 1.
Range in the assessment profile.

**2: Analysis of parameter 2:**
**Measuring the span of the
loudness of the voice in the
improvisation.**
The voice can sound at different
levels of loudness. It can sound like
almost a whisper or very loud. In a
voice improvisation the voice can
very in loudness and this analysis
is about measuring the span of the
loudness of the voice in the
improvisation by determining both
the softest and loudest level.

**Method of measuring the loudness of
the voice in the improvisation.**
Listen to the sound file and
measure the span of loudness of
the client’s voice in the improvisa-
tion according to the following scale:

- Very low
- Pianissimo - Very soft / quiet -
Almost at a whisper.
- Soft - Softer than speaking
voice.
- Mezzo-piano - Moderate soft -
Similar to the speaking voice.
- Moderate loud
- Louder than speaking
- Speaking loud.
- Loud / strong - Speaking

**3: Analysis of parameter 3:**
**Measuring the mean richness in
the sound of the improvisation.**
A voice can be more or less rich on
overtones. It is the amount of overtones that partly determines how rich or full the voice sounds. The more overtones, the richer the voice, the more full the voice resonates. When lacking resonance and overtones the quality of the voice sounds thin and flat.

Method for measuring the mean richness of the sound quality of the improvisation.
Listen to the sound file of the CoreTone and measure the mean richness according to the following scale:

5. Very full / rich
4.
3. Full / rich
2.
1. Very flat / thin

Record the measurement of the mean richness with a cross in the Likert-scale: 3. Richness in the assessment profile.

4: Analysis of parameter 4: Measuring grade of mean tension vs. breath in the sound of the improvisation.
The sound of a voice can be breathy or tense. If the sound is breathy there is an audible air escaping during soundgiving. The voice lacks clarity and is usually reduced in loudness. If the sound is tense there is a “hard edge” to the sound, or it can even sound creaky or harsh. A modal voice is a voice where air and pressure are balanced and produce a free clear sound.

Method of measuring the grade of tension vs. breath in the sound of the improvisation.
Listen to the sound file of the improvisation and measure the mean tension or breath in the sound of the voice in the improvisation according to the following scale:

5. Very tense, pressed voice
4.
3. Modal voice.
2.
1. Very breathy voice

Record the measurement of the mean tension vs. breath with a cross in the Likert-scale: 4. Tense / Breathy in the assessment profile.

5: Analysis of parameter 5: Measuring the form and structure of the improvisation.
The client is asked to “let go” and play vocally. While listening to the vocal improvisation it can be experienced more or less fluent and free in form and structure. If the improvisation is very fluent and free in form and structure one tone leads naturally to the other. In other words the client is “letting go” and playing vocally, and expressing herself or himself very fluent and free.

Method for measuring the form and structure of the voice improvising.
Listen to the sound file of the improvisation and according to the following scale:

5. Very fluent and free. One tone leads naturally to the other and moves freely and fluently in the form and structure.
4.
3. Quite free and fluent.
2.
1. Rigid / Restricted

Record the measurement of the form and structure of the voice improvisation with a cross in the Likert-scale: 5. Form and structure in the assessment profile.

6. Analysis of parameter 5: Measuring the dynamics of the voice in the improvisation. Dynamics are in this context defined as forms of vitality, and not defined according to the usually restricted understanding of changes in loudness in the voice. Forms of vitality are energy, power, and force in motion connected to the voice in the improvisation, and is the opposite of having a static or rigid / monotone voice. These forms of vitality can have different intensities.

In a voice improvisation the quality of breathing and vocalisation is very fluent and free. If the vocal improvisation it can be experienced more or less fluent and free in form and structure. If the improvisation is very fluent and free in form and structure one tone leads naturally to the other. In other words the client is “letting go” and playing vocally, and expressing herself or himself very fluent and free.

Method for measuring the fluency of breathing and vocalisation.
Listen to the sound file and measure how fluently the breathing and vocalisation are according to the following scale:

5. Very fluent
4.
3. Quite fluent
2.
1. Not at all fluent

Record the measurement of fluency of breathing and vocalisation with a cross in the Likert-scale: 7. Fluency in the assessment profile.

8: Analysis of parameter 8: Measuring the sound quality or qualities of the voice in relation to a spatial body sensation.
Depending on what quality the voice has, the resonance can be experienced at different places in the body, a spatial body sensation. In this measurement the focus is especially on the head, the throat and the chest, a vertical measurement. Further to a vertical experience there can be a sensation of an outward direction, or an inward direction as a horizontal experi-
ence. This quality can either be experienced as emerging from the front or the back of body, or it can be experienced as centred in the middle of the body where it is balanced between the quality of the front and the back.

The voice can in an improvisation vary in quality, and there might be several qualities present in the improvisation as a whole.

To support upper explanation of sound quality it might be a support to listen to the two reference sound files connected to the CoreTone.

To support upper explanation listen to the two reference sound files:

CoreToneHorizontal - the horizontal movement starting sounding an /ah/ sound in the middle of the body, moving to the back, and then back to the middle, and from the middle to the front, and back to the middle of the body.

CoreToneVertical - The vertical movement starting sounding an /ah/ sound in the chest moving to the head and back to the chest.

Method for measuring the sound quality or qualities of the voice in the improvisation.

Listen to the sound file of the improvisation and measure the different qualities present in the improvisation according to the following scale:

<table>
<thead>
<tr>
<th>Front of the body</th>
<th>Head</th>
<th>Centred in the body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back of the body</td>
<td>Throat</td>
<td>Centred in the body</td>
</tr>
<tr>
<td>Back of the body</td>
<td>Chest</td>
<td>Centred in the body</td>
</tr>
</tbody>
</table>

Record the measurement of the sound quality or qualities with one cross or several crosses in the Likert-scale: 8. Body in the assessment profile.
Glissando

1. The range:
   Ascending glissando

2. Ending ascending glissando

3. Fluency
   □ Very fluent
   □ Quite fluent
   □ Not at all fluent

Sound file: GLI 01
CoreTone

1. Measuring pitch

2. Loadness
   - Loud / strong
   - Moderate strong
   - Very soft / quiet

3. Richness
   - Very full / rich
   - Full / rich
   - Very flat / thin

4. Tense / Breathy
   - Very tense pressed voice
   - Modal voice
   - Very breathy voice

5. Fluctuation
   - Very consistent and stable
   - Consistent and stable
   - Constantly varied and unstable

6. Body
   - Head
     - Front
     - Center
     - Back
   - Throat
     - Front
     - Center
     - Back
   - Chest
     - Front
     - Center
     - Back
CoreToneVolume

1. Measuring pitch

2. Loadness
   - Loud / strong
   - Moderate strong
   - Very soft / quiet

3. Richness
   - Very full / rich
   - Full / rich
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   - Very consistent and stable
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6. Body
   - Head
     - Front
     - Center
     - Back
   - Throat
     - Front
     - Center
     - Back
   - Chest
     - Front
     - Center
     - Back

Sound file: CTV 01

Music therapist: XXX
### Song

1. **Loadness**
   - □ Loud / strong
   - □ Moderate strong
   - □ Very soft / quiet

2. **Richness**
   - □ Very full / rich
   - □ Full / rich
   - □ Very flat / thin

3. **Tense / Breathy**
   - □ Very tense pressed voice
   - □ Modal voice
   - □ Very breathy voice

4. **Fluctuation**
   - □ Very consistent and stable
   - □ Consistent and stable
   - □ Constantly varied and unstable

5. **Body**
   - □ Front
   - □ Center
   - □ Back

   - □ Head
   - □ Throat
   - □ Chest

Sound file: SO 01
### Improvisation

1. **Range**
   - [ ] Very wide / expanded / extended
   - [ ] Wide / expanded / extended
   - [ ] Very narrow / reduced / small

2. **Mean loadness**
   - [ ] Loud / strong
   - [ ] Moderate strong
   - [ ] Very soft / quiet

3. **Mean richness**
   - [ ] Very full / rich
   - [ ] Full / rich
   - [ ] Very flat / thin

4. **Mean tense / Breathy**
   - [ ] Very tense pressed voice
   - [ ] Modal voice
   - [ ] Very breathy voice

5. **Form and structure**
   - [ ] Free
   - [ ] Quite free
   - [ ] Rigid / Restricted

6. **Dynamics**
   - [ ] Very dynamic
   - [ ] Varied
   - [ ] Very rigid and monotone

7. **Fluency**
   - [ ] Very fluent
   - [ ] Quite fluent
   - [ ] Not at all fluent

8. **Body**
   - **Head**
     - [ ] Front
     - [ ] Center
     - [ ] Back
   - **Throat**
     - [ ] Front
     - [ ] Center
     - [ ] Back
   - **Chest**
     - [ ] Front
     - [ ] Center
     - [ ] Back

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**Sound file:** IMP 01
Happy Birthday

Faroese:

Tillukku til tíñ,
Tillukku til tíñ,
Tillukku goðí (name)
Tillukku til tíñ.

English:

Happy birthday to you,
Happy birthday to you,
Happy birthday dear (name),
Happy birthday to you.