

Embodied meaning in musical gesture
Cross-disciplinary approaches

Porto International Conference on Musical Gesture
17-19 March, 2016

Erik Christensen
Aalborg University, Denmark
erc@timespace.dk

<https://aalborg.academia.edu/ErikChristensen>

Listening for embodied meaning

- | | |
|-----------------------------|----------------------|
| 1. Phenomenology | 1st, 2nd person |
| 2. Expressive music therapy | 1st, 2nd, 3rd person |
| 3. Receptive music therapy | 1st, 2nd, 3rd person |
| 4. Neuroscience | 3rd person |

I.I Phenomenology - Open Listening

1st & 2nd person

Piece for string quartet 30 seconds

Listen twice

What did you hear?

Tell your neighbor

One minute

1.2



Emerson String Quartet

Webern: Bagatelle op. 9, no. 1 0'30

Thomas Clifton 1976, 1983

1.3 Intensive listening: Phenomenological variations

Open listenings

Focused listenings: descriptions

Hermeneutical listenings: interpretations

Dialogues

Christensen 2012: 42-63

1.4 Intensive listening

1st & 2nd person

Multiple repeated listenings:

First person descriptions and interpretations

Dialogues: Intersubjective evaluations of the
multivariable musical experience

Don Ihde 2007:29-32, 2012:18-22;

Ian Cross 2005:30; Aksnes & Ruud 2008:55

2.1 Expressive music therapy

Improvisation, one minute.

Therapist: drums. Autistic boy: cymbal

gesture
expression
interaction



Wigram et al. 2002: 253-256

2.2 Methods

for description and interpretation
of gesture, expression, and interaction
1st, 2nd, 3rd person

Lawrence Ferrara 1984; Even Ruud 1987
Colin Lee 2000; Gro Trondalen 2003, 2007
Overview in Christensen 2012: 26-42

2.3 Expressive music therapy

Parent-child improvisation

1st, 2nd, 3rd person

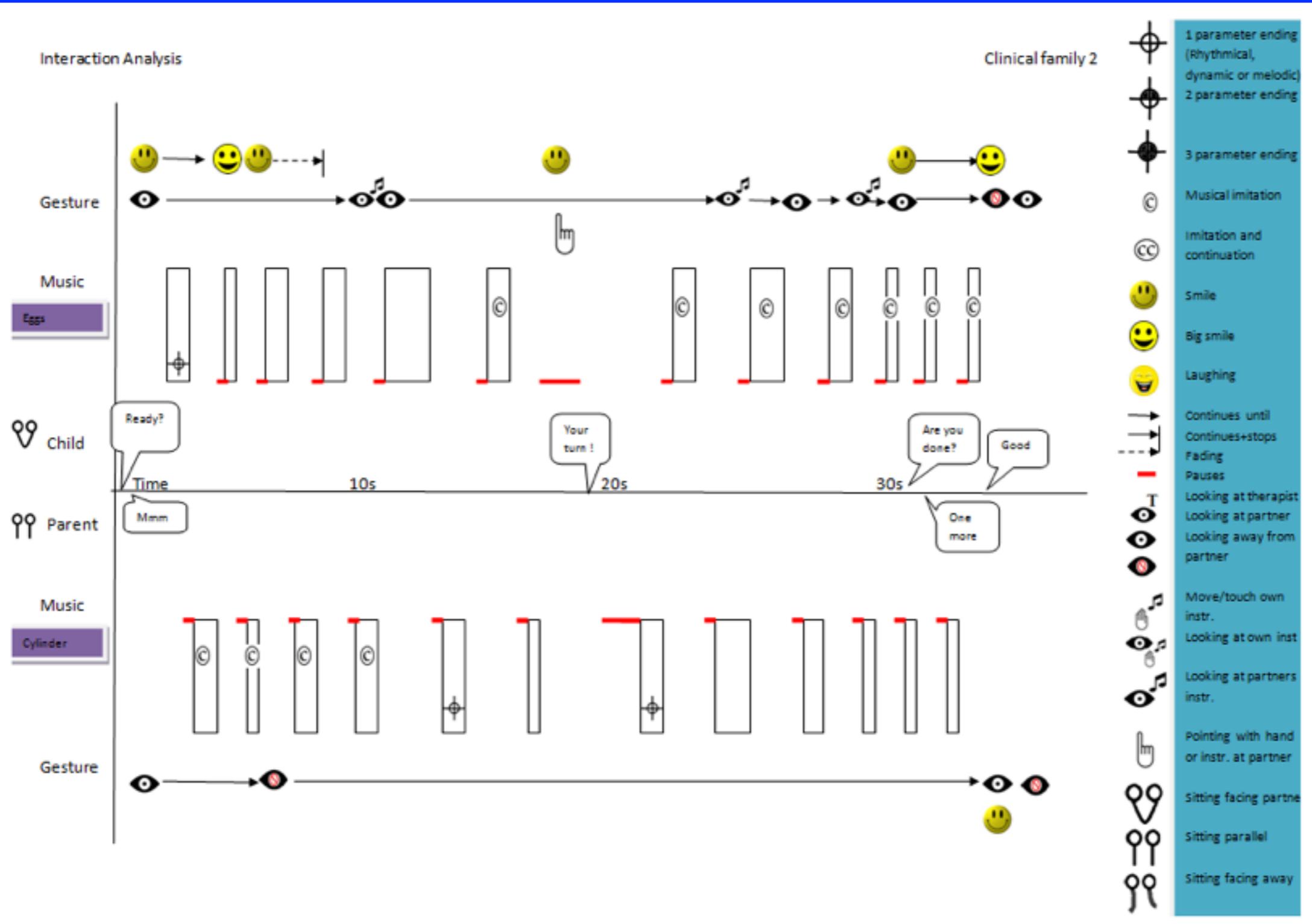
Goal: Assessment and development of
parental competences

Jacobsen 2012

Jacobsen, McKinney & Holck 2014

2.4 Method: Interaction analysis

Jacobsen 2012:162



3.1 Receptive music therapy

Music listening in a relaxed state

GIM: Guided Imagery and Music

The client describes

*music-induced images, memories,
body sensations, emotions, narratives*

The therapist guides with sparse
comments

3.2 Method: Correlations between

Musical gestures and structures

and

Experienced imagery and narrative

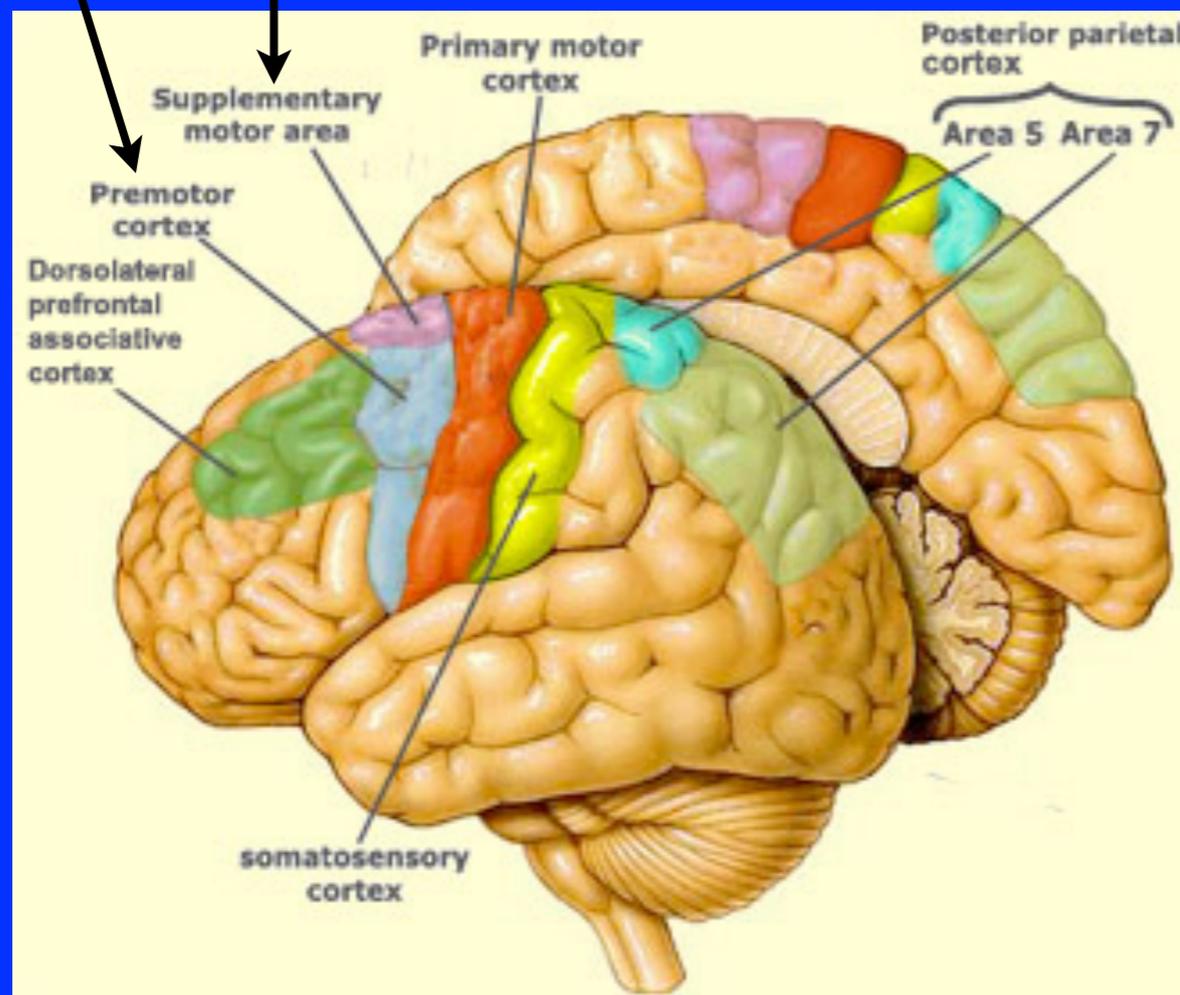
Grocke 2007; Bonde 2004: 257-268

4.1 Neuroscience

Music listening activates motor planning in Cortex

PMA: Premotor Area

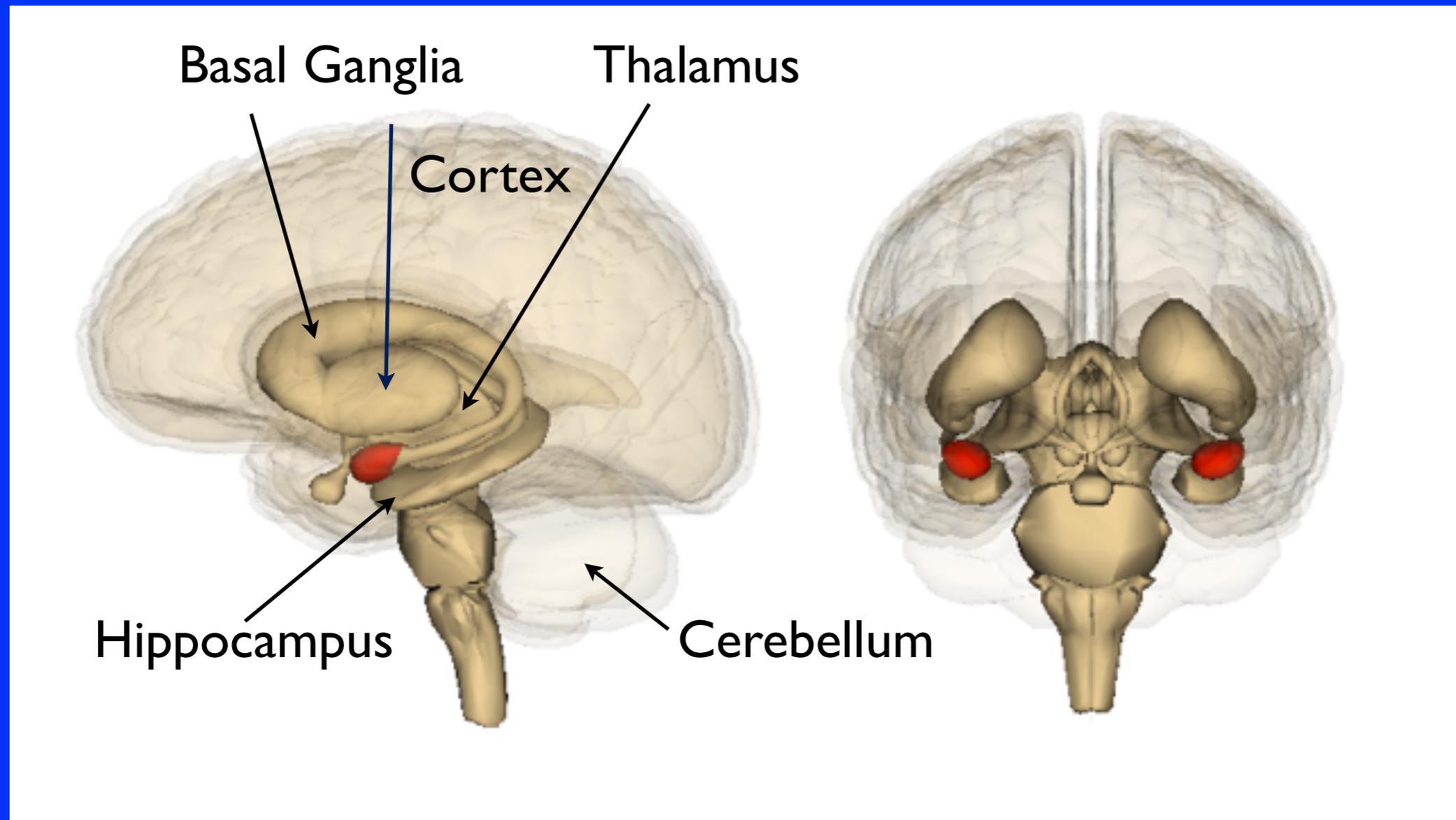
SMA: Supplementary Motor Area



Zatorre et al. 2007

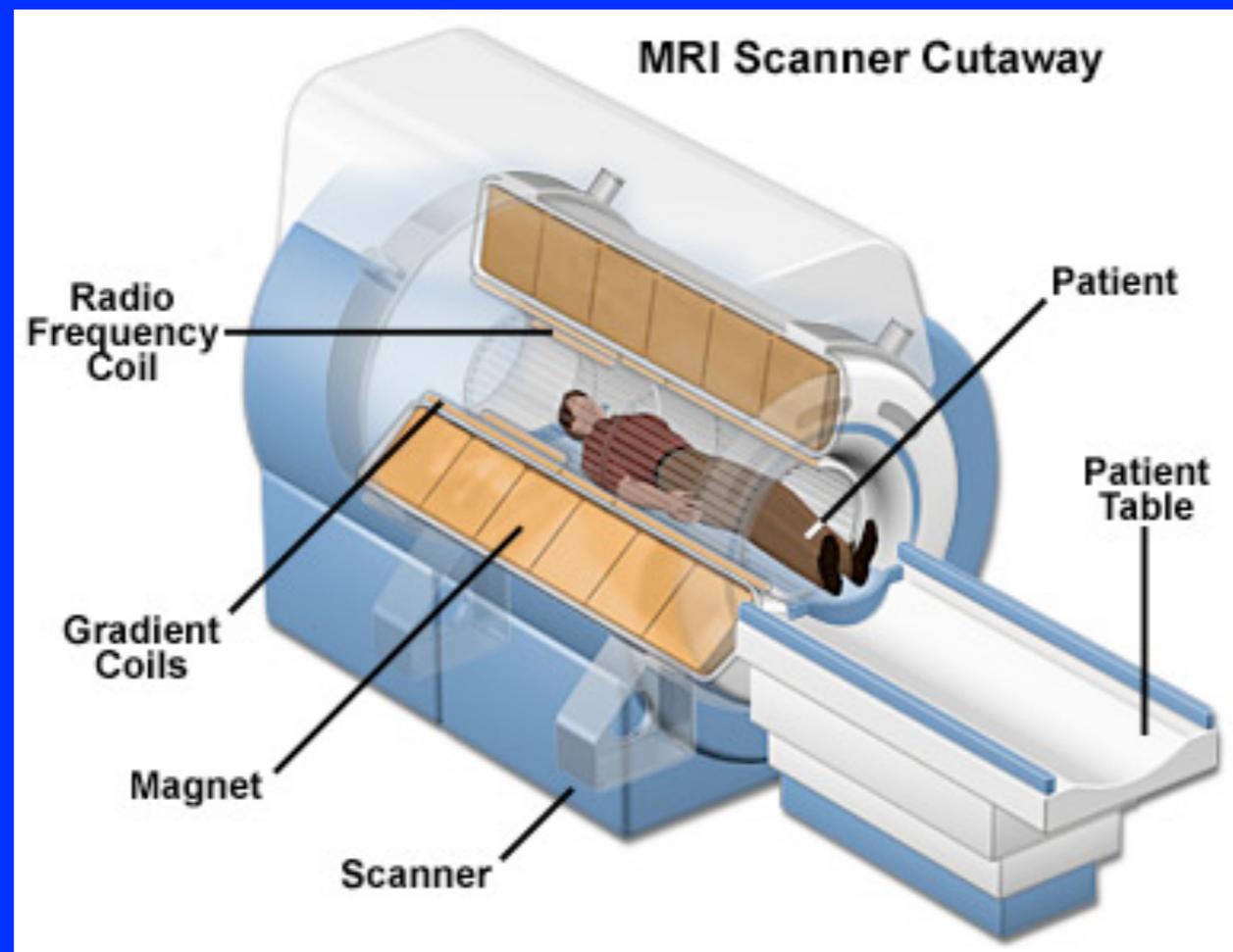
4.2 Neuroscience

Music listening activates the Basal Ganglia and Cerebellum



Zatorre et al. 2007

4.3 Neuroscience method: fMRI scanning during music listening 3rd person



4.4 Neuroscience method: EEG 3rd person



4.5 Two different kinds of music:

Beat-related music

Music in free flow

“The mind is capable of organizing temporal patterns without reference to a beat” (Patel 2008:98)

Beat-related entrainment: Grahn & Rowe 2009

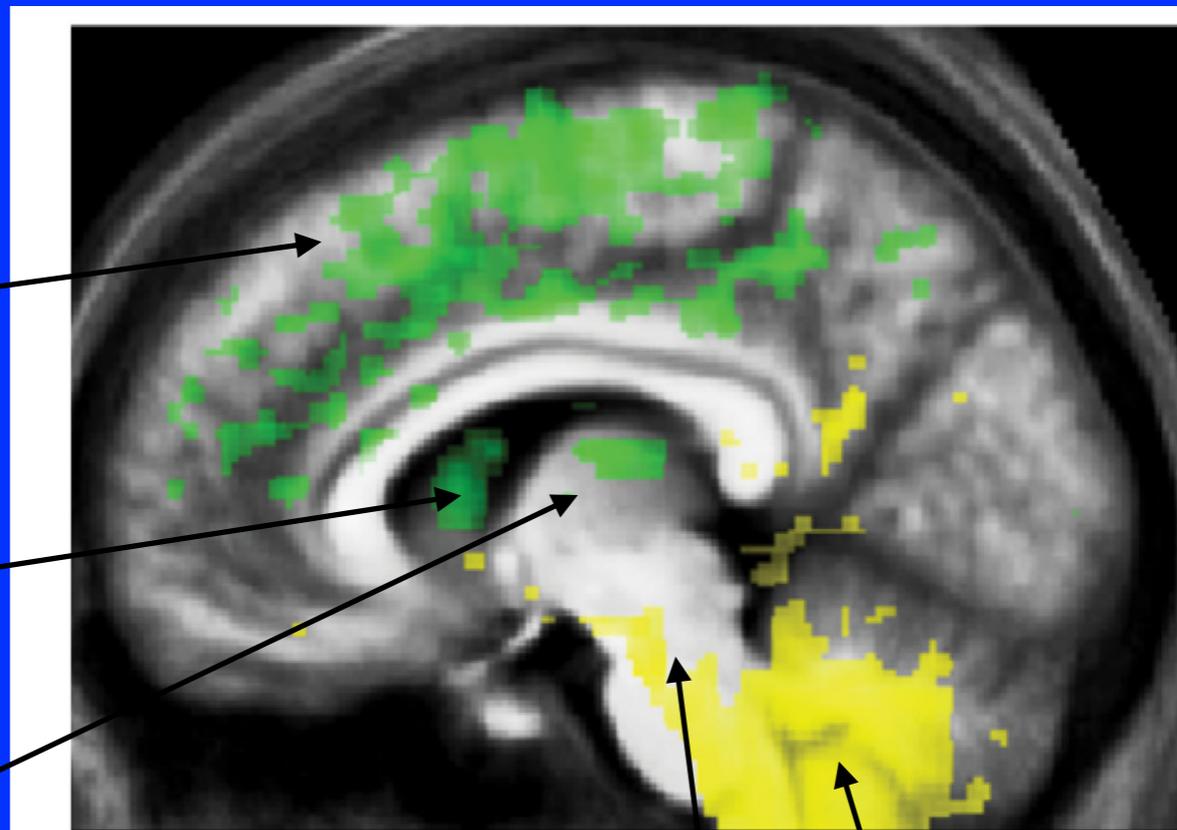
Free flow: Huron 2006:187; Leman et al. 2009

4.6 Two networks for auditory timing

Beat-based:
Cortex

Basal ganglia

Thalamus



Duration-based:

Brainstem nuclei

Cerebellum

Teki et al. 2011, 2012

5. Suggestions for Cross-disciplinary approaches

5.1. Cross-disciplinary approach

Extending studies
of guqin music
to neuroscience



Henbing & Leman 2007, Leman et al. 2009

5.2 Cross-disciplinary approach Neuroscience and music therapy

Systematic comparisons in fMRI:
Predominant gestural music in free flow
versus

Predominant beat-related music

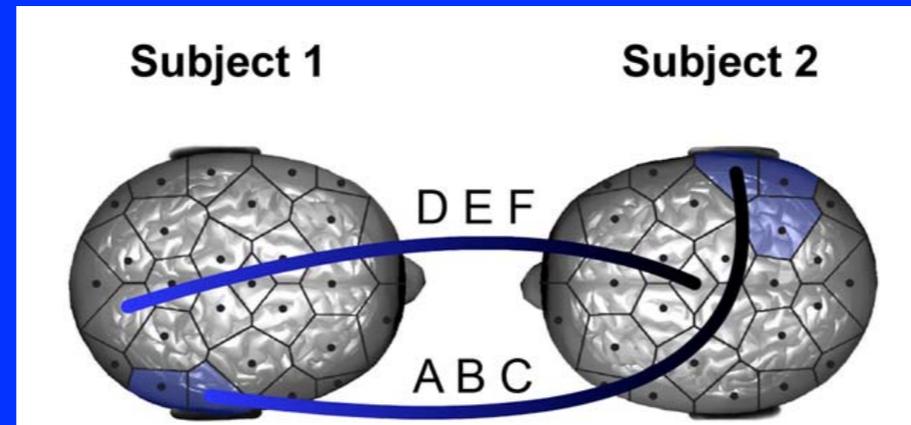
including audio and video recordings of
music therapy improvisations,
music from different continents,
contemporary art music

5.3 Cross-disciplinary approach
Phenomenology, linguistics,
sound analysis, neuroscience

Comparison of gestural timing
in music and spoken language

Kotz & Schwartz 2010; Schwartz et al. 2013

5.4 Cross-disciplinary approach Music therapy and neuroscience: Dual EEG



Dumas et al. 2010



Inter-brain research: Konvalinka & Roepstorff 2012; DeVos et al. 2014

Thank you for listening!



What are your questions and suggestions?

References

Aksnes, H. & Ruud, E. (2008). Body-based schemata in receptive music therapy. *Musicae Scientiae* 12 (1), 49-74.

Bonde, L.O. (2004). *The Bonny Method of Guided Imagery and Music (BMGIM) with Cancer Survivors*. PhD Dissertation, Aalborg University.

Available at <http://www.mt-phd.aau.dk/phd-theses/>

Christensen, E. (2012). *Music Listening, Music Therapy, Phenomenology and Neuroscience*. PhD Thesis, Aalborg University. Available at <http://www.mt-phd.aau.dk/phd-theses/>

Clifton, T. (1976). Music as constituted object. *Music and Man* 2, 73-98.

Clifton, T. (1983). *Music as Heard. A Study in Applied Phenomenology*. New Haven: Yale University Press.

Cross, I. (2005). Music and meaning, ambiguity and evolution. In Miell, D., MacDonald, R. and Hargreaves, D.J. (eds.) *Musical Communication*. Oxford: Oxford University Press, 27-43.

DeVos, M., Gandras, K., and Debener, S. (2014). Towards a truly mobile auditory brain-computer interface: Exploring the P300 to take away. *International Journal of Psychophysiology* 91, 46–53.

Dumas, G., Nadel, J., Soussignan, R., Martinerie, J. & Garnero, L. (2010). Inter-Brain Synchronization during Social Interaction. *PLoS ONE* 5(8): e12166.

doi:10.1371/journal.pone.0012166

Ferrara, L. (1984). Phenomenology as a Tool for Musical Analysis. *Musical Quarterly* 70 (3), 355-373.

Grahn, J.A. & Rowe, J.B. (2009). Feeling the Beat: Premotor and Striatal Interactions in Musicians and Nonmusicians during Beat Perception. *The Journal of Neuroscience* 29 (23), 7540 –7548.

Grocke, D.E. (2007). A Structural Model of Music Analysis. In Wosch, T. & Wigram, T. (eds.) *Microanalysis in Music Therapy*. London: Jessica Kingsley, 149-161.

Henbing, L. & Leman, M. (2007) A Gesture-based Typology of Sliding-tones in Guqin Music. *Journal of New Music Research* 36 (2), 61-82.

DOI: 10.1080/09298210701755073

Huron, D. (2006). *Sweet Anticipation. Music and the Psychology of Expectation*. Cambridge, Massachusetts: The MIT Press.

Ihde, D. (2007). *Listening and Voice. Phenomenologies of Sound*. 2nd edition. Albany, NY: State University of New York Press.

Ihde, D. (2012). *Experimental Phenomenology: multistabilities*. 2nd edition. Albany, NY: State University of New York Press.

Jacobsen, S.L. (2012). *Music Therapy Assessment and Development of Parental Competences in Families Where Children Have Experienced Emotional Neglect*. PhD Thesis, Aalborg University. Available at <http://www.mt-phd.aau.dk/phd-theses/>

Leman, M., Desmet, F., Styns, F., van Noorden, L. & Moelants, D. (2009). Sharing musical expression through embodied listening: A case study based on Chinese Guqin music. *Music Perception* 26 (3), 263-278.

Jacobsen, S.L., McKinney, C.H. & Holck, U. (2014). Effects of a Dyadic Music Therapy Intervention on Parent-Child Interaction, Parent Stress, and Parent-Child Relationship in Families with Emotionally Neglected Children: A Randomized Controlled Trial. *Journal of Music Therapy* 51 (4), 310–332. doi:10.1093/jmt/thu028

Konvalinka, I., and Roepstorff, A. (2012). The two-brain approach: how can mutually interacting brains teach us something about social interaction? *Frontiers in human neuroscience*, Vol. 6, Article 215. <http://dx.doi.org/10.3389/fnhum.2012.00215>

Kotz, S.A. & Schwartz, M. (2010). Cortical speech processing unplugged: a timely subcortico-cortical framework. *Trends in Cognitive Sciences* 14 (2010) 392–399. doi:10.1016/j.tics.2010.06.005

Lee, C. (2000). A Method of Analyzing Improvisations in Music Therapy. *Journal of Music Therapy* 37(2), 147-167.

Lindenberger, U., Li, S-C., Gruber, W., and Müller, V. (2009). Brains swinging in concert: cortical phase synchronization while playing guitar. *BMC Neuroscience* 10(22). doi:10.1186/1471-2202-10-22

Magee, W.L. & Stewart, L. (2015). The challenges and benefits of a genuine partnership between Music Therapy and Neuroscience: a dialog between scientist and therapist. *Frontiers in Human Neuroscience* Volume 9, Article 223, 1-4. doi: 10.3389/fnhum.2015.00223

Moens, B. & Leman, M. (2015). Alignment strategies for the entrainment of music and movement rhythms. *Annals of the New York Academy of Sciences* 1337, 86–93.

Ruud, E. (1987). Musikk som kommunikasjon og samhandling. Teoretiske perspektiv på musikkterapien. [Music as communication and interaction. Theoretical perspectives of music therapy]. Doctoral Dissertation. Oslo: Universitetet i Oslo, Institut for musikkvitenskap.

- Schwartz, M., Farrugia, N. & Kotz, S.A. (2013). Dissociation of formal and temporal predictability in early auditory evoked potentials. *Neuropsychologia* 51, 320–325.
- Teki, S., Grube, M., Kumar, S. & Griffiths, T.D. (2011). Distinct Neural Substrates of Duration-Based and Beat-Based Auditory Timing. *The Journal of Neuroscience* 31(10), 3805–3812.
- Teki, S., Grube, M. & Griffiths, T.D. (2012). A unified model of time perception accounts for duration-based and beat-based timing mechanisms. *Frontiers in Integrative Neuroscience* 5, Article 90, 1-7.
- Trondalen, G. (2003). 'Self-Listening' in Music Therapy with a Young Woman Suffering from Anorexia Nervosa. *Nordic Journal of Music Therapy* 12 (1), 3-17.
- Trondalen, G. (2007). A Phenomenologically Inspired Approach to Microanalyses of Improvisation in Music Therapy. In Wosch, T. & Wigram, T. (eds.). *Microanalysis in Music Therapy*. London: Jessica Kingsley, 198-210
- Wigram, T., Pedersen, I.N., & Bonde, L.O. (2002). *A Comprehensive Guide to Music Therapy*. London: Jessica Kingsley.
- Zatorre, R.J. et al. (2007). When the brain plays music: auditory-motor interactions in music perception and production. *Nature Reviews Neuroscience* 8 (4), 494-521.