



Altered states of consciousness as an adaptive principle for composing electroacoustic music

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ALTERED STATES OF CONSCIOUSNESS AS AN ADAPTIVE PRINCIPLE FOR COMPOSING ELECTROACOUSTIC MUSIC

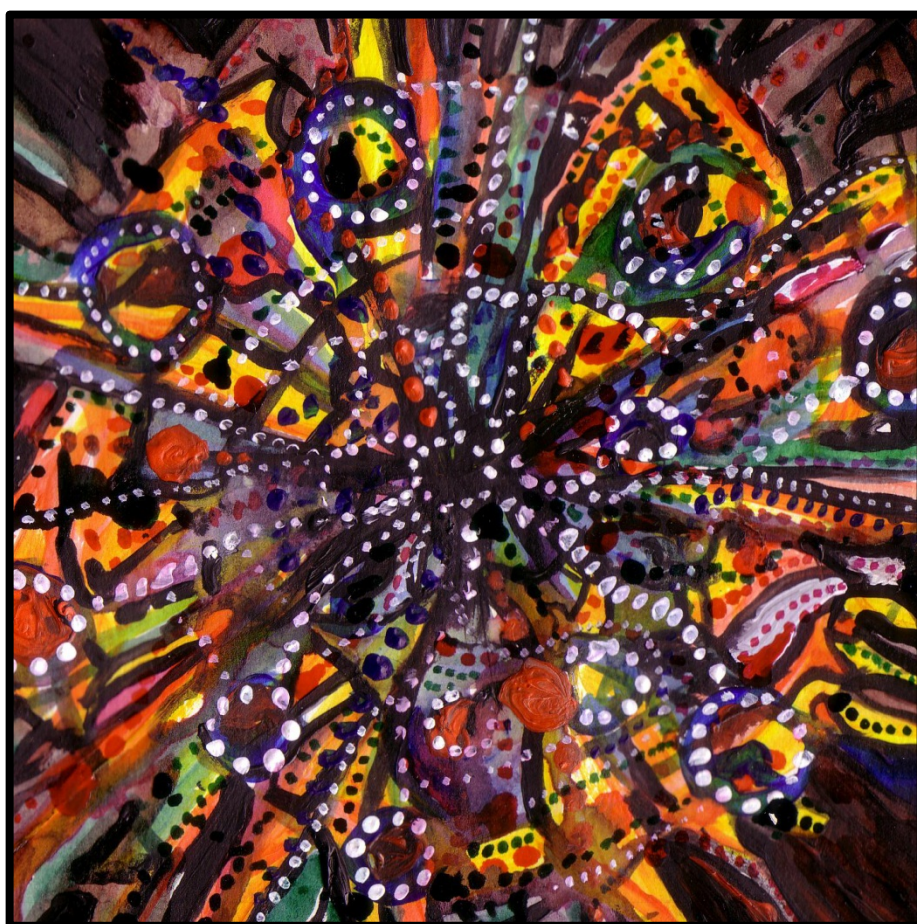
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Cover image is an untitled painting by Jonathan Weinel, 2010.

ABSTRACT

The aim of this research was to use altered states of consciousness (ASCs) as an adaptive principle for composing electroacoustic music, in which common features of the ASC experience provide a basis for the design of sonic material and inform the structural design of corresponding musical sections. Various cultures throughout history have sought to undergo visionary journeys using hallucinogenic plants and drugs. In many cases these experiences have been used as a basis for the creation of art, literature and music.

Informed by a survey of relevant work, this practice-led research develops a compositional process for creating electroacoustic music that is based upon hallucinogenic perceptual states. Though situated within the electroacoustic idiom, the work also draws significantly upon Western psychedelic culture and electronic dance music. The output is a creative portfolio containing a series of musical compositions, software and video. This supporting commentary describes the compositional processes in detail, and it is hoped that it will be of interest to other creative practitioners dedicated to exploring this theme in music and other mediums.

Creative Portfolio

The works contained within the creative portfolio are as follows (all works produced 2007-2011):

Fixed Compositions

Night Breed. Stereo. Duration: 6 minutes and 23 seconds.

Surfer Stem. Stereo. Duration: 7 minutes and 9 seconds.

Night Dream. Stereo. Duration: 7 minutes and 59 seconds.

Entoptic Phenomena. Stereo. Duration: 5 minutes and 44 seconds.

Swamp Process. Stereo. Duration: 7 minutes and 35 seconds.

Nausea. 5.1 multichannel. Duration: 19 minutes and 11 seconds.

Live Performance Recordings

Bass Drum, Saxophone and Laptop: 23rd February 2010, Session 1. Stereo recording of a live performance for bass drum, saxophone and electronics. Duration: 11 minutes and 4 seconds.

Bass Drum, Saxophone and Laptop: Extract 1. Extract from a live performance for bass drum, saxophone and electronics. Duration: 59 seconds.

Bass Drum, Saxophone and Laptop: Extract 2. Extract from a live performance for bass drum, saxophone and electronics. Duration: 59 seconds.

Entoptic Phenomena in Audio: PreICMC04. Recording of a live performance with laptop and electronics, in both stereo and 5.1. Duration 19 minutes and 53 seconds.

Audio-Visual Compositions

Tiny Jungle. Duration: 7 minutes and 10 seconds.

Video Demonstrations of Software

Dagon Live Demo. Video demonstrating the *Atomizer Live Patch* software, with stereo audio. Duration 11 minutes and 9 seconds.

Drone Wolf Demo. Video demonstrating the *Atomizer Live Patch* software, with stereo audio. Duration 8 minutes and 4 seconds.

Bass Drum, Saxophone and Laptop Demo. Video demonstrating the *Bass Drum, Saxophone and Laptop* software, with stereo audio. Duration: 3 minutes.

Software Portfolio

Atomizer Live Patch. Real-time performance software for Max/MSP (Windows).

Bass Drum, Saxophone and Laptop. Real-time performance software for Max/MSP (Windows).

Atomizer Visual. Max/MSP software for producing visual material (Windows).

The creative portfolio is contained within four CD and DVD discs. All stereo works (including fixed compositions and live performance recordings) are presented on a CD audio disc. The audio-visual composition *Tiny Jungle* is included on a DVD video disc, together with the software demonstration videos. The software portfolio is included on a separate data DVD. Finally, an additional data DVD contains the *Nausea* multichannel composition, plus all the creative works and additional files (such as the multichannel version of *Entoptic Phenomena in Audio*).

CHAPTER 1 - HALLUCINATIONS AND MUSIC

An introduction to the context and aims of this practice-led research.

1.1 Varieties of ASCs

Through the rabbit hole

'I was in the municipal park just now. The root of the chestnut tree plunged into the ground just under my bench. I no longer remembered that it was a root. Words had disappeared, and with them the meaning of things, the methods of using them, the feeble landmarks which men have traced on their surface. I was sitting, slightly bent, my head bowed, alone in front of that black, knotty mass, which was utterly crude and frightened me. And then I had this revelation...

...all of a sudden, there it was, as clear as day: existence had suddenly unveiled itself. It had lost its harmless appearance as an abstract category. Or rather the root, the park gates, the bench, the sparse grass on the lawn, all that had vanished; the diversity of things, their individuality, was only an appearance, a veneer. This veneer had melted, leaving soft, monstrous masses, in disorder – naked, with a frightening obscene nakedness.'¹ – Jean-Paul Sartre

In this passage of *Nausea*, Sartre's protagonist Roquentin describes the onset of a strange experience in which his usual perception of the world around him is shattered. Things around him that were once innocuous now become terrifying. The way he perceives the

¹ Jean-Paul Sartre, *Nausea* (Penguin Classics, 2000), pp. 182-183.

roots of the tree, their form and their meaning is altered. Roquentin is experiencing an altered state of consciousness (ASC) comparable to the psychotic experiences of schizophrenics, or those under the influence of hallucinogens such as LSD². The description is likely to have been based on Sartre's own experiences; in 1935 he experimented with the hallucinogen mescaline. Although the effects of this drug usually only last for a few hours, Sartre experienced further episodes for weeks afterwards and fell into a depression that lasted for six months³.

Sartre seems to indicate that a more complete understanding is revealed through his experience; 'existence [is] unveiled'. To use an *Alice's Adventures in Wonderland*⁴ metaphor; he tumbles through the rabbit hole and discovers an irrational world of madness. Ronald Laing and others have referred to these experiences as those of an 'inner world'⁵. To consider the nature of ASCs, or a supposed inner world, we must first look at a question that has been debated by many theorists: what is consciousness?

Although an extended discussion of consciousness is beyond the scope of this commentary, I shall discuss this question briefly in order to contextualise my research. Susan Blackmore provides an overview of many of the approaches to this interdisciplinary area of enquiry, from psychology, cognitive science and philosophy⁶. One of the problems of consciousness is how our subjective experience relates to the physical world around us⁷. For the purposes of this commentary, which describes a process for composing electronic

² Joe K. Adams makes this comparison, referring to hallucinogenic experiences as 'experimental psychosis'. Joe K. Adams, Ralph Metzner and Gunther Weil, 'Psychosis: "Experimental" and Real', in *The Psychedelic Reader*, ed. by Timothy Leary (Citadel Press, 1994). See also Allan Hobson, *The Dream Drugstore* (MIT Press, 2001), pp.5-6 and Susan Blackmore *Consciousness: An Introduction* (Hodder Education, 2010), pp.307-308.

³ David Drake, *Sartre* (Haus Publishing, 2005), p. 36.

⁴ Lewis Carroll, *Alice's Adventures in Wonderland* (Wordsworth Editions Ltd, 1992).

⁵ Ronald D. Laing, *The Politics of Experience and the Bird of Paradise* (Penguin, 1990).

⁶ Blackmore.

⁷ Blackmore, pp.7-21.

music, we shall use the enactive definition discussed by Maturana and Varela⁸. Their discussion of cognition is developed from a biological, evolutionary perspective, where human thought is a combined result of closed internal processes and responses to the environment. Enactivism holds that our subjective experience arises from our interaction with a real environment; the human mind is organised with respect to its situation.

Following this definition, we can accept the idea of an objective environment that we inhabit. ASCs substantially change our normal waking subjective experience of this environment. Hobson discusses the cause of these changes in the brain, plotting them on a three-dimensional 'AIM' (activation, input, modulation) axes⁹. Under this model dreams and hallucinations increase our perception of strange visions or illusions¹⁰; things we presume are internally generated and do not really exist in the physical world around us¹¹. Yet by saying they do not exist as physical matter it is not my intention to devalue their significance. Indeed for shamanic societies, visions have a very real meaning and purpose. One of the motivating factors for this study is my personal view that these states are both highly worthy of human enquiry, and an excellent basis for composing works of art and music.

Varieties of ASC

ASCs can encompass a whole range of phenomena, naturally or chemically induced. In order to consider varieties of ASC I shall use Fischer's cartography (figure 1), as also cited

⁸ Humberto R. Maturana and Francisco J. Varela, *The Tree of Knowledge: The Biological Roots of Human Understanding* (Shambhala, 1998).

⁹ Hobson, pp.44-45.

¹⁰ Hobson, pp.3-27.

¹¹ Susan Blackmore distinguishes between 'illusions' and 'true hallucinations', but notes that there is no clear dividing line. 'Illusions' are understood as misperceptions, while 'true hallucinations' are believed to be real. Blackmore, pp.306-307. Nonetheless under the terms of my discussion, we take both to be internally produced phenomena that do not exist in the objective environment.

by authors such as Fachner¹², Rouget¹³ and Herbert¹⁴. Fischer plots a continuum from ‘ergotropic’ states such as ecstatic hallucination, through normal perception to ‘trophotropic’ states such as those arising from meditation. For the purposes of this study I am primarily interested in ecstatic, hallucinatory ASCs, which fall within the high-arousal ergotropic range of Fischer’s chart. We should however note the crossover indicated by Fischer’s chart; since trophotropic states can be linked to ergotropic ones in a single episode, I shall also peripherally consider them as a basis for musical composition in later chapters.

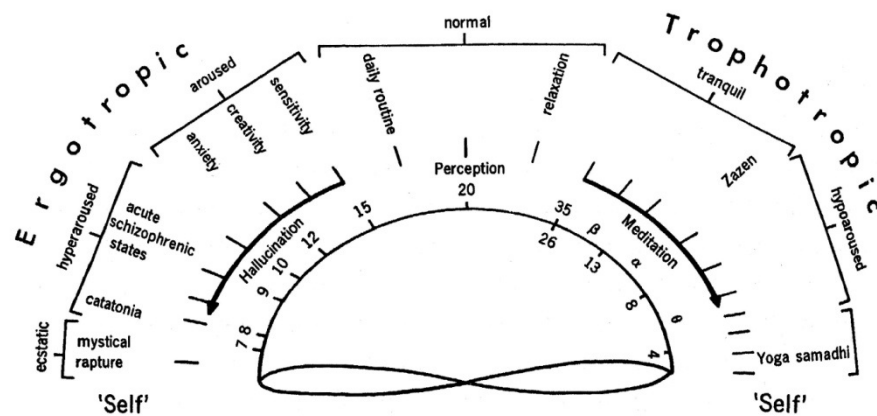


Figure 1. Fischer’s varieties of conscious states. Roland Fischer, ‘A Cartography of the Ecstatic and Meditative States’, *Leonardo*, 6 (1973), 59-66.

States of hallucination may occur through various means. Hobson discusses the close relationship between dreams and hallucinations¹⁵. Hallucinations may result from psychosis or voluntarily through use of psychedelic plants and drugs, fasting, sleep

¹² Jörg Fachner, ‘Music and Altered States of Consciousness: An Overview’, in *Music and Altered States: Consciousness, Transcendence, Therapy and Addictions*, ed. by David Aldridge and Jörg Fachner (Jessica Kingsley, 2005) p. 17.

¹³ Gilbert Rouget, *Music and Trance* (University of Chicago Press, 1985), p.11.

¹⁴ Ruth Herbert, ‘Reconsidering Music and Trance: Cross-cultural Differences and Cross-disciplinary Perspectives’, in *Ethnomusicology Forum* 20 (2) (Routledge: 2011), p.221.

¹⁵ Hobson, pp.3-27.

deprivation or self-flagellation¹⁶. Hypnagogic hallucinations such as the ‘old hag’ phenomenon¹⁷ can result spontaneously from the condition of sleep paralysis. There is also evidence to suggest that DMT¹⁸ is produced naturally in the human brain, leading to speculation on the role it might play in regulating normal consciousness, or in the cause of hallucinatory visions that occur during near-death experiences¹⁹.

Rouget highlights an important distinction between ecstatic states and possession trance states (the latter of which are the focus of his ethnographic study)²⁰. Ecstatic states may involve hallucinations and visionary journeys, as found in shamanic cultures. Possession trance states as Rouget defines them, result in amnesia²¹. Though rituals may involve both ecstatic and trance states, says Rouget, “no one can experience them simultaneously”²².

As I shall explain, my compositional process is not intended to produce music that induces possession trance. Neither is it intended to act as a tool for hypnosis or inducing ASCs through repetitive rhythms²³. Instead I shall be discussing a process for using hallucinatory, ecstatic ASC states, as a conceptual basis for adapting the structure and design of sonic materials in electroacoustic music.

¹⁶ These methods of inducing ASCs are discussed in Aldous Huxley, *The Doors of Perception/Heaven and Hell* (Flamingo, 1994). See also Blackmore, pp.308-309.

¹⁷ The ‘old hag’ refers to a common perception during sleep paralysis that an old woman or creature of some kind is sat on ones chest. David J. Hufford, *The Terror That Comes in the Night: An Experience-Centred Study of Supernatural Assault Traditions* (University of Pennsylvania Press, 1989), p. 246.

¹⁸ Dimethyltryptamine, a powerful hallucinogen.

¹⁹ This is discussed in Rick Strassman, *DMT: The Spirit Molecule: A Doctor's Revolutionary Research into the Biology of Near-Death and Mystical Experiences* (Brumby Books & Music (The Scribo Group), 2001).

²⁰ Rouget, p.11.

²¹ Judith Becker develops discussions of trance from an enactive perspective in *Deep Listeners: Music, Emotion and Trancing* (Indiana University Press, 2004). Becker’s perspective considers trance states in terms of Damasio’s theory of ‘core consciousness’ (encompassing sense of self, and environmental situation) and ‘extended consciousness’ (the autobiographical self). Becker proposes that trancers experience ‘core consciousness’, but that ‘extended consciousness’ is displaced by a trance persona, derived from cultural figures (such as spirits or demons). See Becker, pp.131-149.

²² Rouget, p.23.

²³ While some authors discuss the neurophysiological potential of repetitive rhythms to induce ASCs (e.g. through stimulation of alpha waves), Rouget argues against the validity of these claims. Rouget, pp.167-183.

1.2 ASCs in culture

Historical overview

There are many traditions that have used psychedelic hallucinogens as a means to achieve altered states of consciousness. Ethnographic research explores this area in detail; here I shall give a brief contextual history. *Plants of the Gods* catalogues 97 different plants that exhibit intoxicating or hallucinogenic effects when consumed by humans²⁴. Ritual consumption of these plants is varied and extends back several millennia. It is suggested that Pituri was used 40,000 to 60,000 years ago by the ancestors of today's Aborigines, who use this plant as a means to access dreamtime. Use of the Peyote cactus in Mexico is estimated to date back 2000 years, perhaps longer²⁵. There is speculation upon the role hallucinogens may have played in ancient cults such as the Eleusian Mysteries²⁶, and even in the development of consciousness in early man²⁷. Visionary plants are found natively over much of the globe. Particularly in the Western hemisphere there are many examples of cultures that have revered these plants²⁸. There is suggestion that in 16th Century Europe intoxicating plants and mushrooms were employed in witchcraft as hexing herbs²⁹. Michael J. Harner cites accounts regarding the use and preparation of witches' flying ointments³⁰. These indicate that Belladonna, Mandrake, Datura and Henbane were used as intoxicating ingredients. The hallucinogenic properties of the ointment account for the tales of witches flying through the air and cavorting with spirits and demons at Sabbats, says Harner. The Peyote and mushroom cults of Mexico and the Ayahuasca Shamanism of

²⁴ Richard E. Schultes, Albert Hofmann and Christian Ratsch, *Plants of the Gods: Their Sacred, Healing and Hallucinogenic Powers*, 2nd edn (Healing Arts Press, 1996), pp. 34-60.

²⁵ Schultes, Hofmann and Ratsch, p. 144.

²⁶ Schultes, Hofmann and Ratsch, p. 102.

²⁷ Terence McKenna, *The Archaic Revival: Speculations on Psychedelic Mushrooms, the Amazon, Virtual Reality, Ufos, Evolution, Shamanism, the Rebirth of the Goddess* (HarperCollins, Australia, 1998), pp. 142-153.

²⁸ Schultes, Hofmann and Ratsch, pp. 28-29.

²⁹ Schultes, Hofmann and Ratsch, pp. 48, 55, 86-91.

³⁰ Michael J. Harner, *Hallucinogens and Shamanism* (Oxford University Press, 1973), pp. 125-150.

the Amazon still exist today. In cultures such as these, visionary plants are considered to be a sacred medicine, which allows healing through contact with spirits of the inner world³¹.

In 1938 Albert Hoffman synthesized lysergic acid diethylamide (LSD). In the 1950s and 1960s LSD was used in psychotherapy trials with some success, before becoming popular in the counter culture of the time as a recreational ‘psychedelic’ drug. LSD was subsequently banned in the United States with most other Western countries following suit. MDMA (commonly known as ‘ecstasy’), originally synthesized in 1912 by Anton Köllisch followed a similar pattern. The drug was popularised for use in psychiatry by Alexander Shulgin in the late 1970s and early 1980s. In the early 1980s it started to see use as a recreational drug, eventually leading to its ban in the United States. Through the late 1980s ecstasy became popular as an illegal drug in the UK and Europe, where it was commonly used at raves³². Alexander Shulgin developed many other psychoactive drugs such as 2C-B in the 1970s, which became similarly illegal in most Western countries. Today psychoactive substances such as LSD and MDMA are still used as illegal recreational drugs, often in hedonistic rave and nightclub settings. Some subcultures use entheogens³³ to interpretively recreate shamanic practices in Western society³⁴. Meanwhile organisations such as MAPS (Multidisciplinary Association for Psychedelic Studies) promote the use of psychoactive drugs in further medical research, where some success has been shown in treating psychological problems such as post-traumatic stress³⁵.

³¹ Schultes, Hofmann and Ratsch, p. 62.

³² Dance parties that typically last all night and involve electronic dance music, light shows and recreational drug use.

³³ An entheogen is a psychoactive drug usually derived from plant sources, which is used for spiritual purposes.

³⁴ The ways in which these practices are distinct from traditional non-Western practices are discussed in Graham Harvey, ‘Shamanism in Britain today’, in *Performance Research* 3 (3) (1998), pp.15-23.

³⁵ Multidisciplinary Association for Psychedelic Studies (MAPS). ‘MAPS: MDMA Research’ <<http://www.maps.org/research/mdma/>> [accessed 27 August 2010].

ASCs in art and literature

Just as usage of plants and drugs for altering consciousness extends back into human history, so too does the creation of artwork based upon these experiences. It has been suggested that some of the earliest known rock art may have been produced by shamanic societies, as a means to represent hallucinogenic visions³⁶. Many of the cultures discussed in the previous section have produced artworks that are based on altered states of consciousness. For example: aboriginal artworks that are based on dreamtime, or the Shipibo patterns based on ayahuasca visions³⁷.

In Western culture there are many examples of ASC influenced art. Surrealist art (beginning in the 1920s) explores ideas of dreams and the unconscious as discussed by Freud and Jung³⁸, through non-sequitur juxtapositions. Henri Michaux produced ink drawings based upon mescaline experiences³⁹. The 1960s saw a boom in psychedelic artwork, which emerged as part of the counter culture of the era. San Francisco concert posters filter the LSD experience into the designs through use of warped lettering, brightly contrasting colours, and optical effects⁴⁰. Artists such as Wes Wilson stylistically adapt the approaches of Art Nouveau in accordance with psychedelic culture⁴¹. Rubin charts the development of psychedelic themes in visual arts since the 1960s, referring to the subsequent work of other notable artists such as Kenny Scharf and Alex Grey⁴². Like

³⁶ James David Lewis-Williams and Thomas A. Dowson, 'The Signs of All Times: Entoptic Phenomena in Upper Palaeolithic Art', *Current Anthropology*, 29 (1988).

³⁷ Schultes, Hofmann and Ratsch, p.130.

³⁸ For a discussion of Jung's ideas about the unconscious see Carl G. Jung, *Man and his symbols* (Arkana, 1990).

³⁹ Henri Michaux, *Miserable Miracle* (NYRB Classics, 2002).

⁴⁰ Christoph Grunenberg, *Summer of Love: Art of the Psychedelic Era* (Tate, 2003), pp.123-129.

⁴¹ Grunenberg, pp.126-127.

⁴² David S. Rubin, Robert C. Morgan and Daniel Pinchbeck, *Psychedelic: Optical and Visionary Art since the 1960s* (MIT Press, 2010).

Wilson, Scarf's paintings draw upon the approaches of pop art, but adapt them to reflect ASCs⁴³.

ASCs have also been portrayed in many works of literature. John Uri Lloyd's fictional work *Etidorhpa*⁴⁴ (originally published in 1895) describes a hallucinatory journey based on the hollow earth theory⁴⁵. Paul Bowles' *A Hundred Camels in the Courtyard* uses a literary mosaic technique to reflect the effects of smoking hashish⁴⁶. Carlos Castaneda's *The Teachings of Don Juan: A Yaqui Way of Knowledge* describes visionary journeys and metamorphosis in the narrative of the story⁴⁷. These are but a few illustrative examples.

ASCs in music

Music appears to have a special connection with ASCs. Rouget discusses the use of music in trance and shamanic cultures such as those of Bali (and many others), where music is involved in the production of trance states⁴⁸. While the diversity of practices Rouget refers to cannot all be described here, he draws a general distinction between the use of music in possession trance cultures and shamanic ones. In the former, music is played to the trance initiate to induce possession, while in the latter a shaman may play an instrument such as a drum or rattle to conduct the ritual.

In modern Western culture, the 1960s saw the arrival of psychedelic music. Garage rock n' roll music took on psychedelic themes and sounds, through lyrical content and effects pedals that warped and coloured the sound⁴⁹. Johnson and Stax discuss these approaches,

⁴³ Rubin, Morgan and Pinchbeck, pp.25-26.

⁴⁴ John U. Lloyd, *Etidorhpa: Or the End of the Earth - The Strange History of a Mysterious Being and the Account of a Remarkable Journey*, Revised edition (Kessinger Publishing Co, 1992).

⁴⁵ Hollow Earth theory presumes that the Earth contains substantial interior space. The theory has been used as a source of inspiration for many fictional novels, most famously Jules Verne, *Journey to the Centre of the Earth*, New edition (Wordsworth Editions Ltd, 1996).

⁴⁶ Paul Bowles, *A Hundred Camels in the Courtyard*, 2nd edn (City Lights Books, 1967).

⁴⁷ Carlos Castaneda, *The Teaching Of Don Juan: A Yaqui Way of Knowledge* (Penguin, 2004).

⁴⁸ Rouget.

⁴⁹ Ann Johnson and Mike Stax discuss the transition from garage rock to psychedelic rock in 'From Psychotic to Psychedelic: The Garage Contribution to Psychodelia' in *Popular Music and Society*, 29 (4)

also noting the introduction of exotic sonic material derived from Eastern influences, which may support the ‘otherworldly’ quality of the music for Western audiences⁵⁰. The process can also be considered as one of adaptation: the typical musical approaches of blues and rock n’ roll form a basis for psychedelic rock. However, to varying degrees the compositional approach adjusts the sounds, lyrical content and musical structure to reflect ASCs and the psychedelic counter-culture. Of course, we should not reductively consider psychedelic music as solely an expression of drug experiences; such works must be viewed in the broader counter-cultural context and revolutionary spirit of the times. Nonetheless, Johnson and Stax highlight the clear correlation between aspects of the musical compositions and ASC experiences.

Similarly although 1970s dub reggae should not be seen as psychedelic music, it has been suggested that marijuana use may have played a role in shaping the music⁵¹. While Veal’s discussion highlights other factors that are more significant to the development of dub music⁵², he also comments upon the popularity the music gained among audiences of psychedelic rock outside of Jamaica. The indication is certainly that dub music can be interpreted as a musical form that reflects the perceptual distortions of ASCs, even if this wasn’t necessarily the artists’ original intention. If this lacks assurance, it becomes more concrete in strands of music such as trip-hop that re-appropriate the approaches. German band Substanz-T’s *Heavenly Connection*⁵³ makes the connection explicit, juxtaposing a disorientating miasma of dub textures with excerpts from Allen Ginsberg poems; ‘with dreams with drugs with waking nightmares’.

(Taylor and Francis, 2006), pp.411-425. For an introduction to 1960s psychedelic garage rock, see Various Artists, *Nuggets: Original Artyfacts from the First Psychedelic Era, 1965-1968* (Rhino, R2 75466, 1998).

⁵⁰ Johnson and Stax, pp.416-418.

⁵¹ Michael E. Veal, *Dub: Soundscapes and Shattered Songs in Jamaican Reggae* (Wesleyan University Press, 2007), pp.80-85.

⁵² For example, Veal discusses dub music in relation to African diaspora. Veal, pp.196-219.

⁵³ Substanz-T ‘Heavenly Connection’, *Beyond E* (Hymen, ¥756, 2007). The band’s name is derived from ‘Substance-D’, a fictional hallucinogen in Philip K. Dick’s novel *A Scanner Darkly* (Gollancz, 1999).

Electronic dance music such as the acid house and rave music of the late 1980s, can be viewed in relationship to drugs (particularly MDMA) and psychedelic culture⁵⁴. Simon Reynolds discusses this, arguing (for example) that the approach to sound design used in trip-hop and 1990s drum and bass reflects the paranoia and perceptual distortions of habitual drug use, through appropriate use of techniques in sampling and time-stretching⁵⁵. Psy-trance⁵⁶ (or ‘Goa trance’) is perhaps the most prominent contemporary music and subculture overtly related to the psychedelic experience.

These examples are drawn selectively to broadly illustrate some ASC related art, literature and music. I have drawn particular attention to Western psychedelic culture and electronic dance music, as these significantly inform my work in subsequent chapters.

Shamanic electroacoustic music

While electroacoustic music is not typically seen in relationship to psychedelic culture, there are compositions that explore the concept of shamanism. Barry Truax’s *The Shaman Ascending* is a notable example, which demonstrates how the medium can be seen as means to evoke otherworldly states:

‘The Shaman Ascending evokes the imagery of a traditional shaman figure chanting in the quest for spiritual ecstasy. However, in this case, the listener is placed inside of a circle of loudspeakers with the vocal utterances swirling around

⁵⁴ For a historical account of electronic dance music see Simon Reynolds, *Energy Flash: A Journey Through Rave Music and Dance Culture* (Picador, 2008).

⁵⁵ Reynolds, pp. 313-362.

⁵⁶ Psy-trance or ‘Goa’ is a form of electronic dance music based around trance rhythms, psychedelic sounds and related themes. For an example see Astral Projection, *Dancing Galaxy* (Trust In Trance, TIT CD012, 1997).

*at high rates of speed and timbral development. The work proceeds in increasing stages of complexity as the shaman ascends towards a higher spiritual state.*⁵⁷

Truax's composition is suggestive of an altered state of consciousness; the motion of vocal utterances creates a sonic experience, which is unlike those that we might usually encounter in everyday life. The concept of ascension informs the design of the piece, and is realised primarily through use of rising pitch. While the materials of the composition are based imitatively upon Inuit throat singing, Truax's approach seems to owe more to his own imaginative interpretation of shamanism than the typical form of the experience itself.

Gary Kendall also discusses his use of shamanism as a basis for composing pieces of electroacoustic music such as *Ikaro*⁵⁸. Kendall states that the structure of the piece mimics the stages of an ayahuasca ceremony, and draws upon the sounds from these and the Peruvian landscape. However, he indicates that the main purpose of the piece is to reflect the form of shamanic songs through electroacoustic music, and draw upon the 'healing energies' of these 'sacred sounds'.

Both Truax and Kendall's approaches seem to emerge from imaginative reinterpretations of shamanic experiences. Elsewhere, Kendall discusses how the electroacoustic medium may provide an effective means for constructing journeys through imaginary spaces⁵⁹. For Kendall, works such as Denis Smalley's *Empty Vessels* enable the listener to experience a series of sonic frames, in locations where they should not be (such as a garden pot).

Manipulation of voices to create unusual or disorientating spaces, as heard in Truax's piece, enable these spaces to be based upon imaginary ones, such as those that might be

⁵⁷ Barry Truax, 'The Shaman Ascending (2004-2005)' <<http://www.sfu.ca/~truax/shaman.html>> [accessed 15th November 2011].

⁵⁸ Gary Kendall, 'Bridging a Shamanic Worldview and Electroacoustic Art', *EMS11 Proceedings* (2011). <<http://www.ems-network.org/spip.php?article316>> [accessed 15th November 2011]. Also see Kendall's webpage: 'Ikaro' <<http://www.garykendall.net/compositions/Ikaro.html>> [accessed 15th November 2011].

⁵⁹ Gary Kendall, 'Spatial Perception and Cognition in Multichannel Audio for Electroacoustic Music', *Organised Sound* 15 (3), (Cambridge University Press, 2010). pp.231-233

experienced in a shamanic experience or ASC. However, neither *The Shaman Ascending* or *Ikaro* attempt to closely base the design of these spaces on the actual visions or hallucinatory spaces which are described in first-person ASC accounts. While the method discussed in this commentary also uses ASCs as a basis for composition, one of the intentions of this research is to further develop the relationship between first-person descriptions of hallucination, and the design of sonic materials and structure. Thus while Truax's piece is based upon his notion of a 'higher spiritual state', the compositions that I will discuss in later chapters will be based upon typical aspects of an ASC experience, such as the hallucinatory forms discussed in psychological experiments.

ASCs and the effects of music

Rouget discusses the role of music in trance cultures. His discussion reveals that the effects of music in these situations are most likely attributable to their acquired cultural meaning, in the context of traditional rituals. Rouget indicates that there is no single musical approach that reliably induces trance through neurophysiological effects, but that elements of the music may contain socially understood meanings that contribute to the production of ASCs. To what extent however, do other artworks (such as those in Western psychedelic culture) provide the conditions to achieve ASCs?

Fachner refers to a range of psychological studies on drugs and music, which suggest that it is possible for music to heighten or intensify drug experiences⁶⁰. This may correlate with Saldanha's assertions regarding Goa trance; that the music acts as a tool for achieving ecstatic rapture, in combination with drugs, dancing and culture⁶¹. While Saldanha does not indicate that 'Goa freaks' (as he terms them) experience the amnesiac possession states

⁶⁰ Jörg Fachner, 'Music and Drug-Induced Altered States of Consciousness', in *Music and Altered States: Consciousness, Transcendence, Therapy and Addictions*, ed. by David Aldridge and Jörg Fachner, 1st edn (Jessica Kingsley, 2005), pp.90-96.

⁶¹ Arun Saldanha, 'Music is Force', in *Massachusetts Review* 50 (1-2) (Massachusetts Review Inc, 2009), p.72.

that Rouget refers to, there is some indication that music plays a significant role in attaining ecstasy.

Herbert argues for a broader definition of ‘trance’ (than Rouget’s), which encompasses secular listening experiences including those that do not involve the use of drugs, such as immersive iPod listening⁶². Following such a definition brings us towards the notion that almost any music can, in theory, have some sort of trance potential. While I find this type of broad distinction unhelpful (there is a difference between amnesiac states of possession and being lost in one’s iPod, and I feel it is worth preserving the ‘trance’ term for the former), she highlights the efficacy of the effects that music can have on us in certain situations. How are these effects achieved?

DeNora cautions us of ascribing any absolute effects to the compositional design of music, highlighting the flexibility of possible interpretations, dependant upon context and listener⁶³. Yet she also indicates that musical forms may ‘afford’ certain uses for listeners, which become reinforced through patterns of use. Thus as part of a two-way process (between music and listener), music can acquire potential meanings and effects⁶⁴. This is concordant with Rouget, but it can also be applied to a broader context.

1.3 ASCs as an adaptive principle for composition

Adaptation

As we have seen, music can play a role in inducing ASC states, in the appropriate social context. However the process I will be discussing in this commentary, involves the use of ASCs as an adaptive principle for designing musical structures and materials. As discussed, this is not conceived as a means to achieve trance states in Rouget’s terms, or

⁶² Ruth Herbert, ‘Reconsidering Music and Trance: Cross-cultural Differences and Cross-disciplinary Perspectives’, in *Ethnomusicology Forum* 20 (2) (Routledge, 2011).

⁶³ Tia DeNora, *Music in Everyday Life* (Cambridge University Press, 2010), pp.21-45.

⁶⁴ DeNora, p.45.

any sort of hypnotic or unusual neurophysiological effect resulting from the arrangement of sound⁶⁵. Instead, common features of the ASC experience – such as the perception of visual patterns of hallucination⁶⁶ provide a basis for the design of sonic material, and aspects such as the onset, plateau and termination of a drug experience inform the structural design of corresponding musical sections.

The process can be described as an ‘adaptive’ principle for composition, since ASCs will be used as a basis for modifying the familiar techniques of electronic and electroacoustic music. The distinction of ‘adaptation’ is used to illustrate how the idiomatic approaches of electronic music also inform my compositional process. The works are situated within electroacoustic culture, in terms of the approaches to digital audio manipulation and the diffusion method of performance through which they have been presented. A work such as *Night Breed* (discussed in the following chapter) structurally draws upon forms that will be familiar to listeners of electronic dance music. Yet the design of the composition is adapted in accordance with ASCs in several specific ways, as I shall detail in the following chapter. In later compositions such as *Entoptic Phenomena*, the onset, plateau and termination of a hallucinogenic experience is used as a basis for defining the structure of the music.

As I shall discuss in subsequent chapters, adaptation will occur on micro and macro levels. The compositional structure can be adapted to reflect the progression of ASC experiences in time. The techniques of electronic music can also be adapted to develop sound objects that are based upon ASCs; for example, where a hallucination contains a cryptic voice, corresponding material can be introduced. Or where the form of a hallucination takes on

⁶⁵ To clarify, the music is not intended to achieve true hypnotic states for the listener, or produce the same effects as drugs or psychosis.

⁶⁶ See Blackmore, p.310. Chapter 3 of this commentary discusses visual patterns of hallucination in greater depth.

natural or cellular characteristics⁶⁷, this can be used as a basis for designing corresponding timbres or parameter envelopes.

Reception

The musical works contained within this portfolio are intended for performance in either a home listening environment, or through diffusion in electroacoustic concerts. Since the work draws upon electronic dance music culture, it was considered appropriate to produce music that could be appreciated in a similar context. While the context for live electronic dance music is usually nightclubs or outdoor sound systems, genres such as ambient and trip-hop are often received in a home listening environment⁶⁸. To accommodate these listening contexts, fixed works were produced in forms such as stereo and 5.1 surround sound, which are more commonly accessible in home hi-fi and cinema systems than the larger multi-speaker systems often favoured by electroacoustic culture. For performance in electroacoustic concerts, it was considered that spatialisation could be appropriately addressed through diffusion.

It is beyond the scope of this research to measure audience response to my music, and thus I make no claims that it has any special capacity to change audiences' consciousness. I shall therefore not be discussing audience reception during the course of this commentary, only the compositional processes. The only comment I shall make here is that speculatively, since my portfolio of music utilises approaches of music that are considered 'psychedelic' in their associated cultures, they may afford (in terms of DeNora) such an interpretation or usage for some listeners. Perhaps some may find that in the context of electroacoustic performance venues, the music transports their imagination on an

⁶⁷ Further discussion of natural or cellular characteristics in hallucination episodes is provided on p.31.

⁶⁸ For a discussion of electronic dance music which is intended for post-club listening, see Reynolds, pp.158-159.

associative journey (as discussed by Kendall)⁶⁹. We may or may not choose to call such an experience psychedelic. Likewise while programme notes might be used to influence this, these are suggestive and not prescriptive. In summary: the process is one that dictates the compositional design of the music, but the audience response remains necessarily open-ended.

ASC features

In order to utilise hallucinatory ASCs as a basis for musical composition, I drew selectively from a range of written accounts and experience reports⁷⁰. While the content of hallucinations varies between individuals, the form of the experience is often comparable across multiple individuals. My ‘ASC features’ list is a non-exhaustive assembly of some of these common features, selectively identified for consideration when composing music. These provide an initial range of principles for adapting a composition. Through the chapters that follow I will expand upon this list and explore certain features in greater depth, as I develop a list of corresponding ‘ASC techniques’.

⁶⁹ For a discussion of non-realistic spaces and journeys in electroacoustic music, see Kendall, pp.231-233.

⁷⁰ In addition to sources which I have mentioned already, a database of ASC experience reports is available online at ‘Erowid Experience Vaults:’ <http://www.erowid.org/experiences/exp_front.shtml> [accessed 22 August 2010]. Additionally the collection: Charles Hayes, Alex Grey and Terence McKenna, *Tripping: An Anthology of True-Life Psychedelic Adventures* (Arkana, 1999). For extended accounts by individuals see the following books: Daniel Pinchbeck, *Breaking Open the Head*, (Reissue) (Flamingo, 2010). Terence McKenna, *True Hallucinations*, Reprint (HarperCollins, 1994).

ASC Feature	Description
Visual patterns of hallucination.	The individual may perceive cobwebs or intricate patterns moving across walls and surfaces, or the inside of their eyelids.
Pattern recognition.	An increased tendency to see patterns in complex forms. For example faces may become more readily perceptible in common objects.
Irrational signification.	Inanimate objects may appear menacing, humorous, or otherwise personified. Roquentin finds the roots of the tree 'bestly', for example.
Shifting perception.	Shifting visual effects; colours appear to become brighter or duller. A room seeming small at one moment and then becoming large the next.
Fluidity or motion.	Wood grains appearing to flow into each other for example.
Focused attention.	Attention may be drawn to examine details more than usual.
Micro-macro.	Perceiving small forms mirrored in larger forms.
Time perception.	Altered sense of time; a short time seeming to pass very slowly, or a long time seeming to pass very quickly.
Ego loss.	Altered perception or complete loss of ego, perhaps resulting in a sense of unity with universe, or fear of death.
Signs, symbols and archetypes.	As if drawn from a subconscious lexicon, mysterious signs and symbols, or familiar motifs one may have seen.
Other meanings in language.	Language may seem to take on enhanced meanings from the phonetics of the words, or may trigger visual phenomena.
Synaesthesia.	Blurring of different senses; colours have a taste, sounds have a smell.
Encounters.	Encounters with unknown entities that may be perceived as spirits, aliens or gods, for example.
Mystical strangeness or otherness.	A sense that cryptic or mysterious hidden knowledge is being imparted through the experience. May occur through symbols or encounters.
Journeys and Narratives.	Overall experience may take the form of a narrative such as a journey or a flight, a series of encounters with people or animals. In other cases narratives may be completely disrupted and non-sequitur.

1.4 Summary

Through the course of this chapter I have outlined an understanding of ASCs, and defined my specific area of interest as the psychedelic hallucinatory experiences produced by plants and drugs. As we have seen there are many rich traditions of ASC related art and culture, which extend back into human history. In some cases we can see that music plays a significant role in producing ASCs, in certain social contexts. I have highlighted that it is not the aim of this practice-led research to compose music that sends audiences into an

ASC or trance state (as defined by Rouget). Instead I will adopt an approach not unlike those examples from the visual arts, where aspects of the ASC experience are used as an adaptive principle for designing corresponding artworks.

In the next chapter I will discuss three fixed electroacoustic works. Through the discussion of these works I shall begin to describe a possible framework for using altered states of consciousness as an adaptive principle for composing electroacoustic music.

CHAPTER 2 - MIMETIC TECHNIQUES IN FIXED ASC COMPOSITIONS

Three compositions based on Timothy Leary's 'seven levels of energy consciousness' model.

2.1 Background

The point of departure for my research regarding altered states of consciousness as an adaptive principle for composition was a series of three fixed electroacoustic works. In these compositions I began to explore the use of ASCs as a basis for composing electroacoustic music, using a variety of approaches. Each piece builds upon the techniques of the previous one and develops new or alternative methods.

Figure 2 shows Timothy Leary's chart of the 'seven levels of energy consciousness'⁷¹. This was used as a conceptual model of ASCs, to develop corresponding compositions. His model claims that there are seven levels of energy consciousness, and that each of these can be accessed and experienced using a certain type of drug. The seven levels are based around fundamental questions which mankind seeks to answer through religious or scientific practices. Leary's chart details the correlations between drug experiences, science, religion and art. Each of the three fixed compositions takes one of Leary's levels of energy consciousness and uses it as a conceptual basis for designing a piece of music.

Altered states of consciousness are analogously described in these fixed compositions through the production of mimetic sonic material. 'Mimetic' refers to Simon Emmerson's discussion of 'mimetic discourse', which describes the signifying potential of sound

⁷¹ Timothy Leary, Tom Robbins and R U Sirius, *The Politics of Ecstasy*, 4th edn (Ronin Publishing, 1998), p.50.

resulting from referential or extrinsic qualities⁷². Through the course of this chapter I will describe the process of producing mimetic sonic material that is based upon Leary's theories of energy consciousness, and the 'ASC features' listed in the previous chapter. Note that in most cases the techniques that are developed in each composition are also used in subsequent works. To prevent excessive repetition I have avoided reiterating such techniques for each work, unless the purpose or use of the technique was significantly different.

Likewise, to limit repetitive use of language I use terms such as 'analogously describe' and 'reflect' throughout this commentary, in reference to this process of designing sonic materials and musical structures which correspond mimetically with ASC experiences. This is highlighted in order to avoid confusion; when I say that an ASC feature is 'reflected', I mean that it has been used as a principle for designing certain aspects of the musical composition. The music therefore 'reflects' some aspects of the ASC feature in question, but is not a direct copy. 'Analogously describe' is used to refer to the same process, and relates to the dictionary definition of 'analogous': 'comparable in certain [but not all] respects'⁷³. In none of these instances is it necessarily presumed to know how the listener will interpret the resulting musical materials⁷⁴.

⁷² Simon Emmerson 'The Relation of Language To Materials' in *The Language of Electroacoustic Music*, ed. by Simon Emmerson (Basingstoke: Macmillan, 1986).

⁷³ 'Analogous', *Concise Oxford English Dictionary* (Oxford University Press, 2002).

⁷⁴ For a brief discussion of audience reception, see pp.23-24 and pp.107-108.

TABLE I

The seven levels of energy consciousness, the drugs which induce them and the sciences and religions which study each level.

Level of Energy Consciousness	Directing Intelligence	Communication Center	Communication Structure	Science	Drug to produce this level	Religious centering on this level	Religion metaphor	Art using this level of energy	Sacramental method
1. Atomic	Nucleus	Electron	Physics	ASTRO-physics	LSD* STP	Bud-dhism	White Light	Psychedelic light electronic music	Utilize psychedelics spontaneous music
2. Cellular	DNA	RNA	Biology	Bio-chemistry	Peyote Psilocybin Yage	Hindu-ism	Reincarnation	Hindu art	Prolonged fasting
3. Somatic	Autonomic nerve plexes	Organs of body	Physiology	MDA Hashish	Tantra	Cakras Kundalini	Bosch	Sensory deprivation	
4. Sensory	Brain	Sense organs	Neurology	Marijuana	Zen, Sufism, early Christianity, Hasidic	Satori	Sensory art	Incense Dance Music Chanting, etc.	
5. Mental-Social	Mind imprint plus conditioning	Social behavior	Psychology	Pep pills	Judaism Protestantism Judaism	Christ Messiah	Reproductive art	Sermons	
6. Emotional stupor	Endocrine centers	Emotional behavior	Psychiatry	Alcohol	Catholism Fundamentalism	Devil	Propaganda	Superstitious ritual	
7. Void			Anesthesiology	Narcotics Poisons	Death cults	Black Void		Suicide Ritual murder	

* While many drugs induce awareness at more than one level (for example hashish turns on at levels 4 and 5), only LSD can move consciousness to all seven levels (often at the same instant).

Figure 2. Timothy Leary's seven levels of energy consciousness.

2.2 Night Breed (6:23)

Night Breed was performed at *Beyond the Dance*, Keele University, 9th June 2008.

Concept

Night Breed is the first composition of my research portfolio that uses altered states of consciousness as a basis for adapting the compositional design of the piece. This composition uses the approaches of electroacoustic music and electronic dance music, which are adapted in accordance with Timothy Leary's 'cellular level consciousness' (figure 2). Using cellular level consciousness as an adaptive principle, organic sounds and morphing texture effects are used to inform the design of sonic materials.

ASC version

Night Breed can be considered as an ASC version of electronic dance music, in a similar way that psychedelic rock is an ASC version of rock music; it is based on a standard form, but specific techniques are employed to adapt the compositional design in accordance with psychedelic ASCs. For this piece I used approaches derived from contemporary electronic dance music such as jungle, techno and dubstep⁷⁵. These can be heard in the rhythmic forms of the piece. For instance, the 4/4 bass drum rhythms introduced at 1:00 are influenced by techno and the section 2:00-2:30 exhibits syncopated rhythms similar to those found in jungle. The blending of signature genre-traits from electronic dance music informs the basic structure and rhythms of the piece. We may also note the presence of 4/4 rhythms that are a standard feature of electronic dance music (for example: techno). This form is then adapted in accordance with altered states of consciousness, using the approaches described below.

⁷⁵ For a definition of techno and jungle see Reynolds. For a definition of dubstep see Rob Young, *The Wire Primers: A Guide to Modern Music* (Verso, 2009), pp.87-94.

Organic sounds

Night Breed was conceived in consideration of altered states of consciousness as organic processes. Hallucinations such as those induced by Psilocybin mushrooms or the Peyote cactus occur as a result of naturally produced chemicals which have hallucinogenic effects when consumed and released into the human brain. Inevitably the release of these chemicals is mediated through metabolism, which affects the quality of the experience. It is therefore possible for these types of experience to be considered as organic processes, which involve organic interactions of matter. When using the term ‘organic’, I am referring to natural dynamics of growth and decay, and the complex variations in physical form that are characteristic of organic matter.

Timothy Leary describes these ASCs as inducing the ‘cellular level consciousness’ category from his seven levels of energy consciousness (figure 2)⁷⁶. Under Leary’s model cellular level consciousness is induced by psychedelics such as LSD, Peyote or Psilocybin, and correlates to ‘the life question’. The life question is concerned with the biological existence of life, and concepts such as ‘genesis, biology, evolution [and] genetics’. In a cellular psychedelic state, these concepts might be experienced through hallucinatory manifestations of DNA coding, visualisations of cell structure and growth, biological processes and evolution.

The aim of *Night Breed* was to utilise ‘organic sound’ as a means to mimetically develop Leary’s concept of cellular level consciousness. My use of the term ‘organic sound’ refers to sound that mimetically reflects natural forms. Therefore ‘organic sounds’ should mimetically reflect a natural predictable order, which is subject to complex variations. This is achieved in *Night Breed* through the following methods:

⁷⁶ Leary, Robbins and Sirius, pp. 13-58.

Organic sound sources

These are sounds where the source material is organic. For example, I recorded sounds that are made from pieces of wood colliding. These sounds use a natural predictable time-varying spectral form, which is characterised by complex subtle variations in timbre caused by the interaction of the materials (including the hands causing the collision, which are also organic). The use of a human vocal sample is another example of an organic sound source. These sounds are audible throughout most of the piece from 0:45 onwards.

Organic transformations

Sound transformations reflect organic forms mimetically. An example is the use of a pitch shifting effect on the bass drum. The pitch shifting effect moves up and down in frequency over time. This is mimetic of organic forms moving in a weaving motion; a snake for example. Note that the pitch shifting motion is not completely regular. To achieve this organic pitch shifting effect I recorded the pitch shifting effect on the original bass drum part in real-time. In doing so, I consider myself as providing the sound with an organic transformation, since it is produced as a result of my own organic interaction with the sound in time. Real-time interaction is considered preferable in this instance to designing breakpoint functions, since this method enables a higher density of pitch variations in time to be affected by the organic motion of the composer's hand. Therefore the sonic transformations incorporate complex, non-linear, variations that are mimetic of organic processes. Sounds where this process is applied are heard from 4:20 – 4:50.

Scattered rhythmic sounds

Scattered rhythmic sounds are used as a means to reflect visual patterns of hallucination, mimetically. These can be heard from 0:40-1:10. Rhythmic sounds were considered to correspond with the perception of cellular visual patterns of hallucination (e.g. a mesh of plant cells). This mimetic process will be discussed in further detail in chapter 3.

Shifting perceptual focus

Morphing and texture blending effects were utilised to reflect the changing perception of sounds mimetically from foreground to background. This is congruous with the ASC feature ‘shifting changes in perceptual focus’, that I mentioned previously. Through use of various techniques involving filters, EQ, reverb, convolution and amplitude envelopes it is possible to create the effect that different sounds are moving in and out of the listener’s focus of attention, or that the source is morphing into a different version of itself. An example of these transitions can be heard at 1:50 – 2:10.

The organisation of these morphing effects is designed to achieve the organic mimesis described in the previous section. For example during the section from 4:50 – 5:50, morphing and transformations of the sounds are used which give the impression of moving under water. The compositional process involves visualising a smooth organic movement of the listener’s perception to an underwater environment, and creating that movement using appropriately designed non-linear envelopes.

Summary

Night Breed explores techniques such as morphing, texture blending, scattered rhythms and the use of organic sounds in order to adapt typical forms of electronic dance music in accordance with ASCs. Techno rhythms, which are inherent within the compositional forms that I developed, remain present. Not all the sounds I used fit with my concept; the metallic sounds are not really organic. However similarly to the wood sounds, metallic sounds have a predictable time-varying spectral form with complex variations and these acquire an organic quality by association with the former. We can also consider that the process of colliding them by hand is subject to the organic variation of the composer’s hand. The pitch transpositions used on the vocal line produce a sound which is conspicuously synthetic, and which I find retrospectively undesirable. Nonetheless the

main achievement of this piece is the way in which the existing electronic dance music forms are altered towards organic ASC aesthetics using the methods described. Mimetic organic transformation gives the composition a sense of movement, as though it were breathing; an appropriate reflection of Leary's cellular level consciousness.

2.3 Surfer Stem (7:09)

Performed as a real-time version at Keele University, 4th November 2009.

Concept

Surfer Stem is based on the concept of Leary's 'atomic electronic level consciousness'. According to Leary this level of consciousness is induced by drugs such as LSD or DMT, and causes hallucinations that enable the viewer to perceive atomic activity; motion and collisions of atoms and electrons, for example. In figure 2 we may note that for this level of energy consciousness, Leary actually cites electronic music as the art form that is able to express this level. In contrast to the organic sounds of *Night Breed*, with *Surfer Stem* I wanted to achieve a more futuristic, digital sounding composition to express Leary's atomic electronic level of consciousness. 'Digital sounds', unlike organic sounds, can be achieved through the use of unnatural mimetic features; linear or stepped envelopes (as is possible with synthetic sound sources), and quantisation, for example.

In order to further develop a concept for the piece, I also used passages from William Gibson's *Neuromancer*⁷⁷. In *Neuromancer*, Gibson describes virtual realities that are digital hallucinations. A passage from *Neuromancer* describes a virtual reality altered state of consciousness in which the protagonist finds himself trapped on a beach that extends infinitely. This juxtaposition of the sublime synthetic beach and the idea of atomic electronic level consciousness provide the concept for *Surfer Stem*.

⁷⁷ William Gibson, *Neuromancer* (Voyager, 1995).

Sonic atoms

‘Sonic atoms’ is the term that La Peste uses to describe the rapid rhythmic and micro-rhythmic sounds which he uses to create his ‘flashcore’ music⁷⁸. ‘Sonic atoms’ were used in *Surfer Stem* as a means to describe Timothy Leary’s atomic electronic level consciousness mimetically. These digital rhythmic and micro-rhythmic sounds can be heard from 2:04 – 2:22 and at various other stages in the composition. These were created using a variety of techniques including rhythmic programming using Renoise⁷⁹, granular techniques and a Max/MSP patch⁸⁰. The use of these rhythmic sounds reflects visual patterns of hallucinations, such as those that may have atomic characteristics. Digital sonic materials (as opposed to organic sounds) were considered to appropriately correspond to these types of hallucinatory patterns. The development of this concept will be discussed further in chapter 3.

Surfer drones

Vocal drone sounds can be heard in *Surfer Stem* at 3:20 – 3:45 and at various other points in the composition. These are created using a short sample from a 1960s surf music vinyl, which is processed using granular time-stretching. The use of these drones relates to the synthetic beach scene from William Gibson’s *Neuromancer*; the surf music source material affords possible signification of a sublime beach (through cultural connotations). Time-stretching the sample conveys the distorted time perception that Gibson describes in the virtual reality ASC. These sounds provide an organic juxtaposition in relation to the

⁷⁸ These sounds can be considered as a development from the fast rhythmic patterns of ‘speedcore’ techno: a fast form of techno with 250+ beats per minute. Fast rhythmic sounds are transformed to the point of abstraction, bearing equal comparison with techno music and electroacoustic artists such as Iannis Xenakis and Bernard Parmegiani, who he cites as his inspiration. For a further discussion of flashcore and the music of La Peste see: Jonathan Weinel, ‘Flashcore: Earth Atomizer, Let’s Go’, *Spannered.org* (2007). <<http://www.spannered.org/music/1181/>> [accessed 14th October 2011].

⁷⁹ Renoise is a multi-track music software in the ‘tracker’ design.

⁸⁰ Max/MSP is a graphical programming language for sound. See ‘Cycling 74’ <<http://cycling74.com/>> [accessed 23 August 2010]. ‘Patch’ describes a piece of software created in Max/MSP. The piece of software described here is an earlier version of the patch discussed in the next chapter.

digital sounds, which relates to the interaction between humans and computers described in the novel.

Dub sounds

Sonic material reminiscent of dub music is used in this composition. At 1:55 a percussive guitar sound can be heard with an echoing effect. The section at 2:04 – 2:50 contains a slow rhythmic bass part beneath the atomic sounds. At 3:01 – 3:20 simulated tape delay effects are used. The use of echo on these sounds was considered a suitable approach to use in correspondence with the principle of distortions to sensory perception, as might be perceived in an ASC.

Summary

Surfer Stem uses several ASC techniques to create a conceptual sound world inspired by William Gibson's *Neuromancer*. Digital sounding rhythmic and micro rhythmic sounds developed from the flashcore music of La Peste are used to reflect Leary's atomic electronic level consciousness mimetically. The use of these sonic atoms as a means to reflect visual patterns of hallucination is a development that will become significant for the subsequent compositions discussed. Drone sounds support this by describing the ASC feature of distorted time perception, evoking the synthetic beach scene from *Neuromancer*. Dub sounds reflect sensory derangement.

2.4 Night Dream (8:00)

Night Dream was performed at MANTIS, Manchester University, 7th March 2009.

Concept

Night Dream is a dark droning piece that is related to *Night Breed*. Although elements of drone are used in the previous two compositions, *Night Dream* uses drone as its main form. The work is based on Leary's 'sensory level consciousness'. Sensory level consciousness

describes a state of heightened sensory awareness, which Leary says can be induced with marijuana. Bass sounds add sensory awareness for the body (as well as the ears). This use of prominent bass sounds continues the use of dub sounds discussed in the previous two works. I considered sensory level consciousness to be an organic ASC (being experienced through the human organism), and hence used a similar organic mimetic process as *Night Breed*. The concept, as the title suggests, is a sensory dream or vision.

Drone sounds

Drones are produced through various techniques of time-stretching and layering of sounds. Drones are used to reflect distorted time perception, an ASC feature identified previously. The use of low frequency drones is intended to add a physical sensory aspect (since these frequencies can be felt as well as heard) to the music in a live diffusion situation, as with the performance of this piece at the University of Manchester. They can be heard throughout most of the composition.

Micro-macro sounds

From 0:20 – 1:20 (and elsewhere in this composition) macro droning sounds are juxtaposed with micro rhythmic textures. The macro reverberating drone sounds create a sense of open space, while the grinding micro textures sound as if they are in a small enclosed space. The juxtaposition reflects the ASC feature of micro-macro perception.

Scattered rhythmic sounds

Scattered rhythmic sounds are used to reflect visual patterns of hallucination, as in *Night Breed*. These scattered rhythmic sounds can be heard from 1:30-2:00. These scattered rhythmic sounds support the micro-macro effect described above.

Summary

Night Dream is a drone piece, which reflects the distortions to time perception and micro-macro perception features of altered states of consciousness. Prominent use of low frequencies adds a bodily sensory impact to the piece in a diffusion context. The work fits within Leary's sensory level of energy consciousness, and the piece is conceptualised as a dream or visionary narrative. The role of narrative in these fixed compositions is discussed at the end of this chapter.

2.5 Summary

Night Breed, *Surfer Stem* and *Night Dream* form a triptych of works based upon Leary's seven levels of energy consciousness. These works develop a variety of compositional techniques that are based upon the use of altered states of consciousness as an adaptive principle. These techniques form a foundation upon which the works discussed in subsequent chapters are based. The table below compares ASC features discussed previously with the ASC techniques I have used to analogously describe them.

ASC Feature	ASC Technique
Cellular level consciousness.	Organic sounds.
Atomic electronic level consciousness.	Digital sounds.
Visual patterns of hallucination.	Scattered rhythmic sounds, sonic atoms.
Fluidity or motion.	Organic transformations.
Shifting perceptual focus.	Morphing, texture blending.
Distorted time perception.	Drone sounds.
Sensory level consciousness.	Physical bass drones, dub bass.
Micro-macro perception.	Juxtaposition of macro drones and micro textures and scattered rhythmic sounds.
Visionary journey.	Narrative techniques.

Mimetic sonic material

These compositions use ASCs as a basis for choices regarding the use of sonic material.

Night Breed uses the concept of a cellular ASC state relating to plant hallucinogens, and so

uses sonic material that is mimetic of organic forms; ‘organic mimesis’. *Surfer Stem* uses the concept of an atomic electronic ASC relating to synthetic hallucinogens, so uses sonic material that is mimetic of synthetic forms; ‘digital mimesis’. Organic or digital mimesis can be applied to the choice of source material, and to sound transformations. In this way the mimetic sound environment can permeate each aspect of the composition; visual patterns of hallucination can be expressed using organic or digital rhythmic sounds, for example. Drones to convey distorted time perception can be designed to sound organic or digital.

Combinations of mimetic sound environments can be used where appropriate; an ASC experience which is considered to have both an organic and synthetic component could use and juxtapose both types. Although predominantly digital, *Surfer Stem* has some organic sounds; the vocal drones for example. This is appropriate because although predominantly conceptualised as a digital hallucination, this hallucination is received through an organic human entity. Combining organic and digital mimetic approaches in the composition reflects this.

Scattered rhythmic sounds

Rhythmic sounds are used in all three compositions to reflect visual patterns of hallucination. The essential concept is that short rhythmic sounds provide material that corresponds with visual patterns of hallucination. These visual patterns might take the form of cellular visions (*Night Breed*) or atomic visions (*Surfer Stem*), the form being dictated by the mimetic use of sound; organic sounds or digital sounds. I shall discuss mimetic techniques to reflect visual patterns of hallucination further in the next chapter.

Drone sounds

Distortions to time perception are commonly mentioned in ASC experiences. Techniques such as granular time-stretching can be used to create drones which reflect distorted time perception, where a single moment seems to last for a longer time than usual (this feature is commonly described in ASC experiences). Extending the tangible length of a sound from its usual finite duration towards one that is flexibly longer signifies the distortions to time perception, which may occur in an ASC experience. This is concordant with Smalley's discussion of continuant phases of sound, which can achieve dissociation from temporal notions of onset and termination⁸¹.

Micro-macro perception

Micro-macro perception can be analogously described through the juxtaposition of micro textures and rhythms with macro drone sounds.

Dub sounds

In these three compositions I use sounds influenced from dub (and related forms such as jungle and dubstep). Prominent bass sounds were considered as a means to reflect physical sensory perception. Echo and delay effects reflect perceptual disorientation.

Narrative techniques

By 'narrative techniques' I refer to structural arrangements that are based upon the concept of a visionary journey. Through developing material using these techniques the composer can create a composition that is conceptually based upon the effects one might perceive in a hallucinatory vision or dream. Just as a journey through the city might include cars, buses and certain types of sound and smell; a visionary experience may include visual patterns of hallucination, distorted time perception and the other features that I have

⁸¹ Denis Smalley, 'Spectro-morphology and Structuring Processes', in *The Language Of Electroacoustic Music*, ed. by Simon Emmerson (Basingstoke: Macmillan, 1986), pp. 61-93.

mentioned. It is up to the composer to arrange these features into an ‘ASC narrative’, completing the picture by contextualising the materials. Narrative structure can be derived from existing compositional forms (e.g. familiar structures of electroacoustic or electronic dance music), books or accounts of visionary journeys, the imagination, or through experimenting with the sounds themselves.

For these initial compositions, musical structures were mainly based on existing forms (e.g. electronic dance music) and an intuitive creative process that relies on musical choice, and the imagination. At this early stage I had not yet developed a clearly defined framework for creating musical structures that correspond with accounts of ASCs. The main development of these works is the adaptation of component sonic materials in accordance with ASCs. In chapter 3 I will develop an approach to structure that more clearly corresponds with accounts of ASCs, as discussed in relation to the composition: *Entoptic Phenomena*.

CHAPTER 3 - ENTOPTIC PHENOMENA IN AUDIO

Musical compositions that reflect visual patterns of hallucination.

3.1 Background

‘Entoptic phenomena’ describes the visual patterns of hallucination perceived during altered states of consciousness, such as those produced by mescaline or DMT. In the previous chapter I began to explore the use of rhythmic sounds to reflect these visual patterns of hallucination mimetically. In this chapter I will discuss entoptic phenomena as they occur in hallucinogenic states, and we shall see how these forms may have inspired some of the earliest known art. To bring the concept of artworks based on entoptic phenomena up to date using modern technology, I developed the *Atomizer Live Patch*. This is a piece of software that facilitates the real-time production of rhythmic and micro-rhythmic sounds, which are used to analogously describe visual patterns of hallucination mimetically. The software also provides a means to contextualise these sounds with drone and pre-planned source material, in order to construct an ASC narrative in real-time. Real-time performance connects the sounds produced with the spontaneity of human imagination, furthering the analogy of sound with the complex biological interactions that produce hallucinations. The *Atomizer Live Patch* was used to create materials for the compositions *Entoptic Phenomena* and *Swamp Process*. These compositions can be performed either as fixed versions, or as real-time performances using a laptop and a MIDI controller (fixed versions are contained within the creative portfolio). This work culminates with the real-time multi-channel performance *Entoptic Phenomena in Audio*; a continuous mix that incorporates these works and others.

3.2 Entoptic form constants

Heinrich Klüver's *Mescal and Mechanisms of Hallucinations* documents a psychological study in which participants were given the hallucinogen mescaline in controlled doses⁸². Klüver's subjects describe changes in perception and visual phenomena that occur during the experience. Over the course of several hours participants would perceive initial visual effects such as lattice and honeycomb shapes, gradually progressing to more and more intricate hallucinations based on these forms. In the later stages these forms overtake external visuals so that real objects may appear to take on honeycomb or lattice shapes. At the peak of the experience complete dreamlike visions and scenarios may be perceived, before the effects begin to recede⁸³.

Although the content of these experiences varies dramatically, Klüver identifies 'form constants' in his subjects' experiences:

*'...mescaline intoxication yielded the following form constants: (a) grating, lattice, fretwork, filigree, honeycomb, or chessboard; (b) cobweb; (c) tunnel, funnel, alley, cone or vessel; (d) spiral. Many phenomena are, on close examination, nothing but modifications and transformations of these basic forms.'*⁸⁴

According to Klüver, these form constants are the basis for mescaline visions. Through the course of the experience, interpretive psychological processes produce progressively more intricate and elaborate visions derived from these forms⁸⁵. For example, a cobweb design in the early stages of hallucination may later be perceived as an actual tunnel in the context

⁸² Heinrich Klüver, *Mescal & Mechanisms of Hallucinations* (University of Chicago Press, 1966).

⁸³ Klüver, pp. 13-32.

⁸⁴ Klüver, p. 66.

⁸⁵ Klüver, p. 86.

of a vision⁸⁶. Klüver is inconclusive as to the origin of these forms but proposes that they may occur due to ‘entoptic phenomena’ (meaning “within the eye”), while a subsequent study by Paul C. Bressloff and others suggests the patterns may be produced in the visual cortex of the brain⁸⁷. Regardless of their exact scientific cause (which is beyond the scope of this research), we may refer to the visual patterns of hallucination associated with mescaline experiences as ‘entoptic phenomena’⁸⁸.

Bressloff and others discuss the origin of these visual forms through an analysis of mathematical expressions that produce similar patterns. Figure 3 shows several of the images from this study. These funnel and vortex shapes can be created from transformations of grids, lattices and honeycombs. The images are shown here to give a general indication of how these form constants may appear, however note that the interpretative process which Klüver describes means that in an actual ASC, entoptic patterns would probably be perceived as visions derived from these forms (as opposed to a direct rendering of these forms). For example, one of Klüver’s participants describes:

‘Immediately before my eyes are a vast number of rings, apparently made of extremely fine steel wire, all constantly rotating in the direction of the hands of a clock; these circles are concentrically arranged, the innermost being infinitely small, almost pointlike, the outermost being about a meter and a half in diameter. The spaces between the wires seem brighter than the wires themselves. Now the wires shine like dim silver in parts. Now a beautiful light violet

⁸⁶ For a discussion of tunnels from the perspective of shamanic practices, see Michael Harner, *The Way of the Shaman* (HarperCollins, 1990) pp.31-38.

⁸⁷ Paul C. Bressloff and others, ‘Geometric Visual Hallucinations, Euclidean Symmetry and the Functional Architecture of Striate Cortex’, *Philosophical Transactions: Biological Sciences*, 356 (2001), 299-330.

⁸⁸ Note that ‘entoptic phenomena’ may refer to other visual phenomena caused physically within the eye. For this article, ‘entoptic phenomena’ refers only to visual patterns perceived under the influence of hallucinogens. The term is used to preserve continuity with studies such as Klüver’s.

*tint has developed in them. As I watch the centre seems to recede into the depth of the room, leaving the periphery stationary, till the whole assumes the form of a deep funnel of wire rings.*⁸⁹

Note that a correlation between Klüver's form constants is recognisable in the description, though a great deal of complexity is added such as the manifestation of wire rings and the animation of the vision. This account can be considered as an interpretive vision derived from the form constants. Klüver indicates that the form constants create a basis for hallucinations that are abstracted through the imaginative faculties of the mind, arriving at various unique visions with varying resemblance to the form constants.

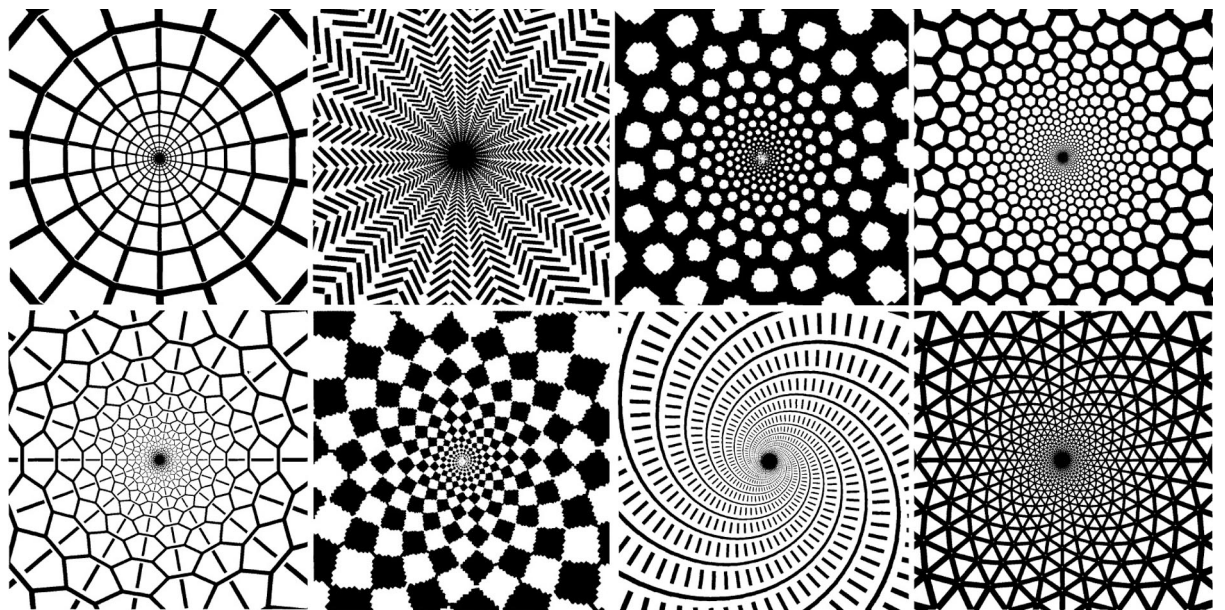


Figure 3. Entopic form constants. Various images from Bressloff and others.

Visions of this kind are also typical of other psychedelic hallucinogens. Rick Strassman's studies on DMT in the 1990s evidence similar results:

'Subjects saw all sorts of imaginable and unimaginable things. The least complex were kaleidoscope geometric patterns, which

⁸⁹ Klüver, p. 14.

*sometimes partook “Mayan”, “Islamic” or “Aztec” qualities. For example, “beautiful colourful pink cobweb; an elongation of light”, tremendously intricate tiny geometric colours, like being one inch from a colour television”... There were “tunnels,” “stairways,” “ducts,” and “a spinning gold disc.” Others saw the “inner workings” of machines or bodies: “inside a computer’s boards,” “DNA double helices,” and “the pulsating diaphragm around my heart”.*⁹⁰

Note that once again, Klüver’s form constants are present with the description of elongated cobwebs and tunnels. The descriptions of more elaborate patterns and forms such as Mayan patterns or circuit boards can speculatively be accounted for as resulting from interpretative complexity caused by imaginative faculties of the mind.

Ancient representations of entopic phenomena

Lewis-Williams and Dowson suggest that ancient cultures as far back as the Upper Palaeolithic era (roughly 10,000-40,000 years ago) may have been shamanic⁹¹. These ancient cultures may have experienced entoptic phenomena during rituals involving hallucinogenic plants. They may have placed great spiritual significance upon them, and been inspired to render them on cave walls where the rituals took place. Figure 4 shows Lewis-Williams and Dowson’s comparison between San, Coso and Upper Palaeolithic rock art⁹². San culture is known to be shamanic, and Coso is believed likely to be. Lewis-Williams and Dowson suggest that entoptic phenomena are commonly represented in San and Coso rock art. Through comparison with Palaeolithic rock art, we can see that similar

⁹⁰ Strassman, p. 147.

⁹¹ Lewis-Williams and Dowson, 201-245.

⁹² ‘San’ refers to the San religion of southern Africa. ‘Coso’ refers to the Shoshonean Coso rock art of the great Californian Great Basin.

forms are also often present. This may indicate that the people who made these markings were also shamanic, say Lewis-Williams and Dowson.

	ENTOPTIC PHENOMENA		SAN ROCK ART		COSO	PALAEO LITHIC ART			
	A	B	ENGRAVINGS	PAINTINGS		MOBILE ART		PARIETAL ART	
			C	D	E	F	G	H	I
I									
II									
III									
IV									
V									
VI									

Figure 4. Entoptic phenomena and rock art comparisons. Reproduced from Lewis-Williams and others, pp. 206-207.

These artworks indicate that not only are there methods to represent entoptic phenomena in art, but also that this may have been one of the earliest creative aims we know of⁹³. I decided to use entoptic phenomena as a basis for my electroacoustic compositions, updating the concept by exploring it through the use of modern digital audio technology.

Entoptic rhythmic sounds

I have previously discussed the concept of sonic atoms; rapid streams of rhythmic and micro-rhythmic sound as used in the flashcore music of La Peste. I identified this compositional approach as a means by which to mimetically reflect the form constants of

⁹³ There are of course counter arguments to Lewis-Williams and Dowson's claims. See 'Comments' in Lewis-Williams and Dowson, pp. 217-238.

entoptic phenomena. Rhythmic and micro-rhythmic sounds are used to analogously reflect the pin-point dots of light perceived during entoptic visions. The spiral dot patterns shown in figure 3 can be reflected mimetically using rapid rhythmic pulses that move in a circular motion around the auditory spatial field. In the same way that vortex patterns shown in figure 3 are produced from transformations of grids, transformations of rhythmic grids using DSP processing can create analogous mimetic sounds. Clusters of rhythmic sounds can be used to describe form constant III from figure 4 mimetically. Form constant III is most applicable to the ‘pointlike’ visual patterns often described in hallucinogenic experiences such as those Klüver discusses, and is the most relevant to the compositions discussed in this chapter⁹⁴. The *Atomizer Live Patch* provides a means to produce material that is mimetic of these visual patterns, and contextualise them within an ASC narrative alongside drones and other pre-planned material.

3.3 Software: The Atomizer Live Patch

The software Atomizer Live Patch is featured project 49 on the Cycling '74 website.

<<http://cycling74.com/2010/03/05/project49-atomizer-live-patch/>> [accessed 29 August 2010].

The *Atomizer Live Patch* consists of three types of sound generating processes. The ‘atomizer’ modules produce streams of rhythmic and micro-rhythmic sound, which are used to describe entoptic phenomena as discussed. A ‘drone machine’ provides a means of creating drones to reflect the distorted time perception of an ASC experience. The additional ‘dj mixer’ enables pre-planned supporting material to be performed continuously in a flexible sequence, contextualising the entoptic and droning sounds within an ASC narrative which may include other types of pre-planned sonic material. All

⁹⁴ This is not to say that the other entoptic forms are not of interest, or could not be conveyed mimetically also; indeed these may be the subject of compositions which I produce in the future.

modules are designed to allow real-time surround sound spatialisation. Developed in Max/MSP, the software provides an efficient means of live performance that incorporates only the desired functionality. The *Atomizer Live Patch* uses semi-random triggering and timing of events in a specialised manner which is not inherently possible using other existing live performance software such as Ableton Live⁹⁵; hence the need to design original software. Since the main function of the software is to produce streams of rhythmic and micro-rhythmic sound, it could also be used for alternative compositional aims. However in this case, the combined use of these sounds with drones and pre-planned material enables them to be contextualised as entopic phenomena within an ASC narrative.

I have discussed previously the purpose of using organic mimesis as a means to reflect ASC experiences, which can be considered as the result of complex biological interactions. For the purposes of this study ‘organic’ refers to forms that resemble those of the natural world, having a predictable macro form that is subject to complex micro variations. The atomizer modules of the *Atomizer Live Patch* use semi-random processes to achieve complex variations in the timing and spectral properties of sounds. The principle is similar to that which is sometimes found in drum machines to accomplish more natural sounds. The sounds produced by a human playing an acoustic drum are never identical; they may be similar and have a predictable time-varying spectral form, but are also subject to complex variations. These complex variations can be simulated using random processes that modify the sound⁹⁶. The atomizer modules achieve this by selecting a sound at random from a bank of similar sounds, and applying semi-random pitch variations to that sound. Semi-random triggering can also be used to control the timing of events. These

⁹⁵ Although this functionality could be incorporated using Max for Live, for the purposes of this project the Ableton software was neither available nor necessary to realise the compositional aims of the project.

⁹⁶ It is accepted that this simulation is imperfect, since the complex variations I am describing are not actually random.

processes achieve a form of organic mimesis, which is considered appropriate when describing ASC experiences of this kind.

The *Atomizer Live Patch* enables the manipulation of entoptic sounds, drones and pre-planned material in real-time using a MIDI controller (presently a Bitstream 3X⁹⁷). Live performance provides another means to achieve organic mimesis through the gestural interaction of the composer with the software. This works in live performance and also in fixed composition where it exists as a recorded imprint. In summary: incorporating real-time and semi-random processes into the performance creates a suitable analogy with ASC hallucinations, which can be considered as spontaneous, unpredictable, organic processes.

Atomizer / atomizer joystick/ribbon

Figure 5 shows the user interface of the *Atomizer Live Patch*. The ‘atomizer’ and ‘atomizer joystick/ribbon’ modules produce rhythmic and micro-rhythmic pulses. The atomizer is a sampler that stores ten short rhythmic sound files. Several banks of these rhythmic sounds are embedded in the patch. When the atomizer is triggered, one of these sound files will be triggered either specifically or at random depending on the trigger note. The trigger for the atomizer can come from a variety of sources. An inbuilt matrix sequencer (figure 6) enables rhythmic patterns to be designed, stored and recalled. The sequencer allows specific or random triggers to be programmed. The button labelled ‘#’ enables instant switching between these patterns at random, while the ‘BPM’ dial enables tactile control over the tempo of the sequenced rhythms. The ‘rand speed’ control module sends a trigger at random intervals with increased regularity as the control value is increased, while simultaneously sending a trigger at regular intervals with increased speed as the control value is increased. The matrix and random/repeating modes of triggering

⁹⁷ See the manufacturer’s web page for details of the Bitstream 3X MIDI Controller. Note that the software could also be used with other MIDI controllers. ‘WaveIdea ~ Bitstream 3X Overview’ <http://www.waveidea.com/en/products/bitstream_3x/> [accessed 23 August 2010].

can be used independently or simultaneously to create rhythmic grids of sound which have variable random components of organisation.

The triggered sound files can be selected for playback either as ‘one-shots’ or as loops. Volume, speed of playback (changing the pitch) and loop end-point can be adjusted. A ‘deform’ control also enables a semi-random pitch bend effect. This control creates a pitch bend based on the random interpolation of two breakpoint graphs. The deform control then adjusts what ratio of this value affects the pitch. Finally audio effects are provided: distortion, ring modulator, delay, reverb, filter and spatialisation: Doppler⁹⁸, pan left/right and front/back.

There are two instances of the atomizer module in the current version of the *Atomizer Live Patch*. The first, shown on the left hand side of figure 5 is the primary module that has a more comprehensive level of control using the 4 sliders and 15 dials located directly beneath the module itself. The second is the atomizer joystick/ribbon module, which utilises its own separate bank of sounds. This is controlled using the X-Y joystick and ribbon controller of the Bitstream 3X. Touching the ribbon produces gestural bursts of sound, while the X-Y control is mapped to the various effect controls and 5.1 spatialisation (so that the X-Y position directly correlates to the spatial location of the sounds).

⁹⁸ The incorporated Doppler Effect is an implementation of a design by Rajmil Fischman.

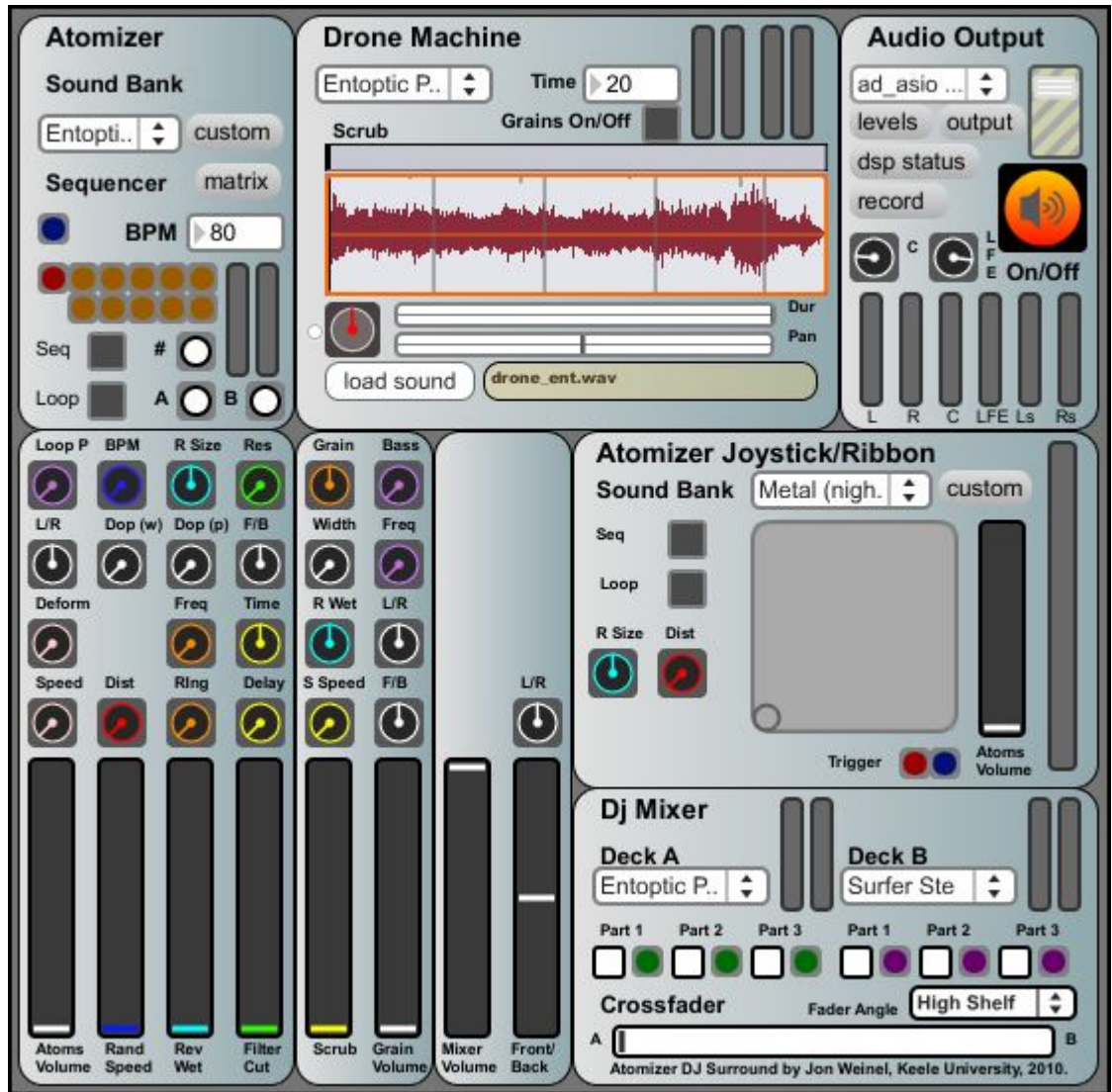


Figure 5. Atomizer Live Patch user interface (current version, 22 May 2010).

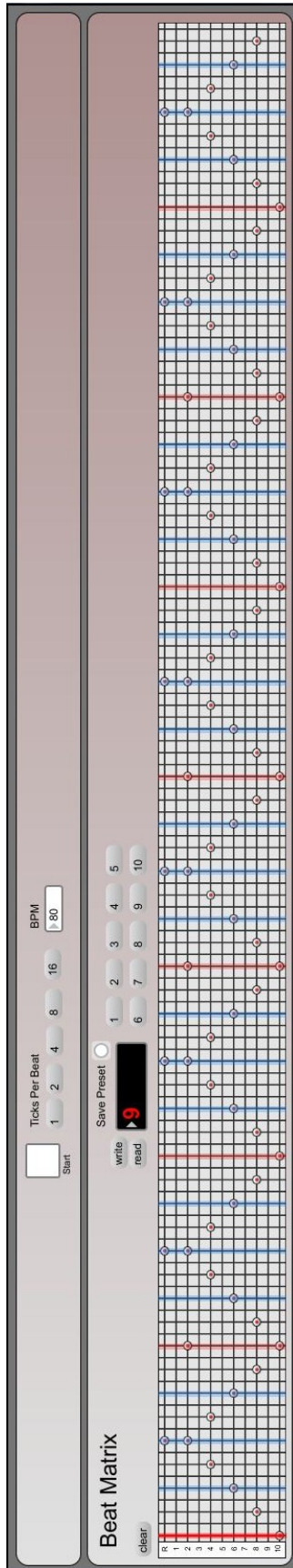


Figure 6. Matrix sequencer from the Atomizer Live Patch.

Drone machine

The centre top module in figure 5 is a granular synthesizer, which is configured specifically for creating drones by a process of granular time-stretching. The drone machine is controlled via sliders 5 and 6 of the Bitstream 3X, which are mapped to control the sample location and the volume of the module. Various other controls (the dials above sliders 5 and 6) allow aspects of the grains to be adjusted, and control effect processing and spatialisation. Two of the dials also control a supporting bass drone that is created with a sine wave signal generator.

Dj mixer

The dj mixer module provides the facility to trigger pre-planned supporting material in a spontaneously designed sequence, in the style of a continuous dj mix. Channels A and B contain three sound file players each of which can be mixed together using the cross-fader, and any of the six sound file players can be started/stopped at will. These sound file players are intended for use with pre-designed sections of music or short sound clips. These can then be introduced into the performance to create a supporting context and structure for the entoptic and droning sounds. The organisation of pre-planned material retains a non-deterministic organic element, by virtue of enabling the performer to create a unique selection and arrangement of the supporting material for each performance.

Dagon Live Demo (11:09)

This is a short demonstration video showing the use of the software. Note that this video was produced with an earlier version of the software, hence the interface is slightly different and I am using different MIDI controllers. Some features are missing from this version of the software, but the principles are essentially the same.

Drone Wolf Demo (8:04)

This second video demonstrates the use of the *Atomizer Live Patch* (once again with an earlier version of the software). *Drone Wolf Demo* demonstrates the patch with some lighter more mellow sounds.

3.4 Entoptic Phenomena (5:44)

Performed as a real-time version at Keele University, 4th November 2009.

Atomizer (1:00) is a modified excerpt from this composition. Atomizer was included in the VoxNovus 60x60 Sanguine Mix and 60x60 Dance, performed at various locations internationally including Stratford Circus, London, 24th July 2010.

Entoptic Phenomena takes the form of an altered state of consciousness narrative, using the ASC experiences described by Strassman's DMT participants as a conceptual model. Strassman's study, along with many other accounts that I have read, informs the narrative concept. This becomes a fully formed whole through the suggestive properties of the sounds during the composition process, and my own creative imagination. I have provided some quotes from Strassman's study to illustrate the types of ASC effects I describe in my composition, but the music is not directly based on these quotes.

The structure of the composition reflects a hypothetical DMT experience on an approximately equivalent time-frame; DMT is a powerful hallucinogen with a fast onset and a short duration:

'The onset of the experience is rapid, the experience being very intense with the higher doses within 30 seconds. It peaks within 2

*to 5 minutes and is usual felt as only a mild intoxication within 20 to 30 minutes.*⁹⁹

Entoptic Phenomena begins and ends with the recognisable sounds of an isolation tank, where it is imagined this hypothetical experience might take place. This approach of leading the composition in with recognisable sounds was influenced by Barry Truax's compositions *The Shaman Ascending* and *Chalice Well*¹⁰⁰. The structure is based upon the concept of a hypothetical ASC experience, with onset, plateau and termination. The onset (beginning) and termination (ending) sections are based on the principle of entoptic phenomena. The plateau (middle) section uses the concept of entoptic phenomena that has become abstracted into an interpretive hallucinatory space, accompanied by a sense of timelessness and strange voices. Sonic materials are arranged in correspondence with these three sections.

From 0:01-0:54, a progression is heard from recognisable sounds to layers of unfamiliar/abstract entoptic sounds. This reflects the onset of visual patterns of hallucination in an ASC experience:

*'There was a sound, like a hum that turned into a whoosh, and then I was blasted out my body at such speed, with such force, as if it were the speed of light. The colours were aggressive, terrifying; I felt as if they would consume me, as if I were on a warp-speed conveyer belt headed straight into the cosmic psychedelic buzzsaw.'*¹⁰¹

⁹⁹ Strassman, p. 103.

¹⁰⁰ Barry Truax performed *Chalice Well* and *The Shaman Ascending* at Keele University (2009).

¹⁰¹ Strassman, p. 212.

Strassman's participants often described an initial wall of 'spinning colours'¹⁰² or similar which they must break through during the DMT experiments. From the descriptions, we can reasonably categorise these 'spinning colours' as entoptic phenomena. At 0:57-1:55 the main burst of entoptic sounds can be heard. In this section you can hear the streams of fast rhythmic and micro-rhythmic sounds that are produced by the atomizer module. These reflect the entoptic phenomena and visual patterns of hallucination described by Klüver and Strassman. The organisation of rhythmic sound into grid formations reflects Klüver's grid and lattice form constants. Using spatialisation effects such as Doppler (heard prominently at 1:30-1:37), these move in a circular motion creating an effect which is mimetic of the tunnels and spirals perceived in entoptic hallucinations; pin-point tunnels of light become rapid spiralling rhythmic sound, like the 'spinning colours' described in the quotation.

*'The spaces between the wires seem brighter than the wires themselves. Now the wires shine like dim silver in parts. Now a beautiful light violet tint has developed in them.'*¹⁰³

Most descriptions of entoptic phenomena in Klüver and Strassman's studies describe temporal shifts and changes to the visual patterns perceived. The changes in brightness and colouration that Klüver's participant describes are reflected mimetically by using effects such as filter, delay and ring modulator. The use of these effects can be heard during 0:57-1:55. A short delay creates a metallic effect, while ring modulator and filter effects provide transformations and colouration of the sounds.

'...the most intense part of each trip was spent tangled up in these colours. This time, I quickly blasted through to the "other side." I

¹⁰² Strassman, p. 213.

¹⁰³ Klüver, p. 14.

*was in a void of darkness. Suddenly, beings appeared. They were cloaked, like silhouettes.*¹⁰⁴

During the section 1:45-1:55 a crescendo ending in silence can be heard. This reflects ‘[blasting] through’ the entoptic phenomena. These sounds give way to a spacious drone atmosphere in the middle section, heard from 1:56-3:20. This is intended to reflect an ambiguous mystical phase of the experience, as typically described in Strassman’s study. Droning sounds are used in accordance with the distortions to time perception that may be perceived during this phase of an ASC experience. Heavily processed voice sounds (heard from 2:04 onwards) are used in correlation with the reports of strange beings or entities that Strassman’s participants describe.

*‘...it was quite rare for volunteers to hear formed voices or music. Rather, there were simply sounds, variously described as “high pitched”, “whining and whirring,” “chattering,” crinkling and crunching.” Many remarked on the similarity of DMT auditory effects to those of nitrous oxide, where there is a “wah-wah,” oscillating, wavering distortion of sounds.*¹⁰⁵

The third and final section of the composition heard from 3:35-5:20 reintroduces entoptic sounds, corresponding with the return of visual patterns of hallucination. These are accompanied by high-pitched sounds and a ‘wah-wah’ modulation of the drones from the previous section. The combination of entoptic and drone sounds used creates textures that resemble the description of sounds in the quotation above.

In an ASC experience produced by drugs, it is usual for the effects to eventually subside.

In accordance with this the composition concludes by returning to the familiar sounds of

¹⁰⁴ Strassman, p. 214.

¹⁰⁵ Strassman, p. 148.

the isolation tank (5:20-5:44), which were heard at the beginning. This reflects the DMT participants' rapid return to normal consciousness after only a few minutes.

3.5 Swamp Process (7:35)

Swamp Process is based on an imaginary hallucinatory scene; a gloomy swamp or cave environment, a bit like something John Uri Lloyd might have described in *Etidorhpa*. The concept is based within Leary's concept of cellular level consciousness, and so uses an organic mimetic sound environment. As a result the entoptic sounds of *Swamp Process* are cellular (organic), rather than atomic (digital). The use of these entoptic sounds is slightly different in *Swamp Process*; the rhythmic sounds usually form clusters that move around within the spatial field as clouds, rather than engulfing it completely. I shall refer to these clouds as 'entoptic creatures'. These 'entoptic creatures' correspond with interpretative visual patterns of hallucination, where the form constants coalesce into collective entities¹⁰⁶. The structure of the composition does not lead the listener in with recognisable sounds like *Entoptic Phenomena*, instead the sonic material is based upon the form of hallucinations (rather than material which is based upon the concept of non hallucinatory real-world environments).

The entoptic creatures can first be heard at 0:28-0:35. The motion of the entoptic creatures is gestural, as heard at 1:00-1:05. Rather than creating an engulfing effect as in *Entoptic Phenomena*, this instead creates the impression that the sounds are a condensed cloud or swarm. We can imagine this in terms of Klüver's description of visionary experiences in the later phases of hallucination, where the patterns become manifested into forms, to the perception of the observer.

¹⁰⁶ This can also be considered in relation to Lewis-Williams and Dowson's discussion of rock art that merges entoptic phenomena and animal shapes, as seen in H/III, figure 4.

At 1:12-1:44 I use slow bass melodies. The use of these is similar to *Surfer Stem*, and is considered to relate to the physical sensory effects that may be experienced during a hallucination.

Droning sounds can be heard from 1:25-1:46. These correspond with the time-distortion and micro-macro principles discussed previously.

From 6:39-7:05 the entoptic sounds engulf the spatial field, creating a similar effect to the use of entopic sounds in *Entoptic Phenomena*, but with more organic sounds.

Swamp Process is an organic ASC composition that uses many of the processes described previously. The composition is based upon the concept of a hallucinatory environment, using a combination of entoptic, drone and dub techniques.

3.6 Entoptic Phenomena in Audio (20:00)

Performed at Analogous Interactions, ISSUE Project Room, Brooklyn, NYC, 31st May 2010. Part of the International Computer Music Conference (ICMC 2010).

Also performed at Energy Flash: The Music of Robert Ratcliffe and Jon Weinel, Keele University, 5th May 2010.

Entoptic Phenomena in Audio combines elements from all other works of the creative portfolio to create a continuous multichannel performance that incorporates live electronics and pre-planned material. The performance is approximately 20:00 in length. The example recording of the performance referred to in this section is *Entoptic Phenomena in Audio: PreICMC04 (19:53)*¹⁰⁷.

¹⁰⁷ This audio file is included as a stereo mix on the accompanying audio CD of the creative portfolio. A multichannel version in 5.1 is also included on the data DVD. These audio files provide an example of the performance only, and are not intended as definitive fixed versions of this composition.

The overall structure is an extended version of *Entoptic Phenomena*. The onset and termination sections from this composition are used at the beginning and end of the performance. At 0:01-2:00 we hear the opening section of *Entoptic Phenomena*; the isolation tank sounds transition into engulfing entoptic sounds. Following this a variety of other sections are heard, using material from various other works from the creative portfolio. These sections are considered as different phases of hallucination. During the piece the performer must use the *Atomizer Live Patch* to control pre-planned musical sections, entoptic sounds and drones. These sections are specially prepared so that some of the drones and entoptic sounds are removed in order to perform these sounds in real-time. The piece draws to a close with the final section of *Entoptic Phenomena* which uses many entoptic sounds, before returning to the initial ‘real world’ sounds of the isolation tank.

The choice and order of musical sections can be selected by the performer in each situation, however for the *Analogous Interactions* and *Energy Flash* concerts I used rough¹⁰⁸ performance notes (figure 7). These notes show only the basic arrangement of musical sections and banks of sonic material to use. Multiple arrangements that I have performed are noted down, so that at the moment of commencing the performance I am able to select one spontaneously. The performance notes provide a planned structure that will create a large-scale ASC narrative, but allow this structure scope to evolve. This is a further example of how the performance incorporates organic spontaneity, reflecting the link between ASC experiences and unpredictable interactions of the imaginative faculties of the mind.

¹⁰⁸ Note that I have included the actual performance notes that I have used, rather than redrawing them more neatly as a more complete graphic score. I have included these to demonstrate their use in the performance process, and how I incorporate scope for non-deterministic structural improvisation. I refer to these as ‘performance notes’ since they are not presented as an example of a proposed score for other composers to perform the piece, they are the working notes that I use to evolve each performance.

The Doppler Effect is efficient in enabling rhythmic and micro-rhythmic sounds to form entoptic spiral and vortex shapes. The most recent version of the patch extends these spatialisation effects into a multichannel context, critically improving the software from the previous version.

The software could be developed with more accurate mappings of vortex and spiral patterns on a macro or micro level, and further improvements to the spatial techniques used could produce more precisely defined entoptic effects. Experimentation with an increased range of source material could also yield interesting results.

Compositionally, there are significant developments that could be made to the parts of the music where the 'break through' section occurs, which go beyond entoptic phenomena. For example, narrative techniques and additional sonic materials could be employed to create more detailed hallucinogenic scenarios of the type described in Strassman's study. Entoptic phenomena has been the focus of this work, however Strassman's participants nearly all describe this as a point of departure in their experiences. Therefore further advances could be made in this music to 'break through' the entoptic phenomena in audio and find a deeper language to describe what lies beyond.

CHAPTER 4 - BASS DRUM, SAXOPHONE AND LAPTOP

Developing methods for ASC enhanced improvisations using live instrumentation and electronics.

The performers on this project were Jonathan Weinel (Bass Drum) and Sol Nte (Saxophone). It was first performed at AutoPlay, Keele University, 29th September 2010. This chapter is published as an article 'Bass Drum, Saxophone and Laptop: Real-time Psychedelic Performance Software' in eContact! 12 (4) (2010). <http://cec.sonus.ca/econtact/12_4/weinel_psychedelic.html> [accessed 15 September 2011].

4.1 Background

Taking a performance by Z'EV and John Zorn as a point of creative departure, *Bass Drum, Saxophone and Laptop* is a piece of software designed with Max/MSP which facilitates improvisational real-time performance for live instruments and electronics. Sol Nte performs saxophone on this project, and I perform with the bass drum. The key aspect of this project is the instigation of a system that adapts an improvised performance in accordance with ASCs, using real-time DSP. As a result my discussion in this chapter will focus upon the adaptive software, with only a brief discussion of the instrumental parts.

DSP effects are incorporated to process the sound of live instruments, while a sampling module called the 'atomizer' produces entoptic sounds. An integral feature of the software is the ability to automate control parameters temporally so that they respond to the live performance. This facilitates a system of interactivity in which the performers respond to the software and vice-versa. The resulting spontaneous interactions and temporally

shifting effects are intended to create an analogy between the sounds produced and the complex biological processes that produce dreams and hallucinations.

Bass Drum, Saxophone and Laptop continues to develop many of the premises for creating ASC artwork, as I have discussed in previous chapters. Here I shall recapitulate those that are most relevant for this piece:

Temporal processing

Changing spectral properties of the sound source creates shifts in timbre, colouring the sound. This reflects the manner in which colour perception of an object may be perceived as shifting temporally in an ASC experience. Different aspects of the colour of an object may appear more pertinent to the observer in an ASC experience at different points in time. For example, the pink shades of a terracotta pot may be more noticeable at one time, while the orange shades may be more noticeable at another. This can be reflected in visual media by mixing the colour values of an image to bring out different shades that are inherent in the object. A similar process can be used in sound by using temporal implementation of filters or ring modulation, which colour the frequency spectrum and enable analogous shifts in the spectral aspects of the sound source which will be perceived.

A comparable process can be applied to reverberation and room presence. By shifting the amount and quality of reverb that is applied to the source sound, it is possible to reflect changing perceptions of room characteristics or physical space. In an ASC experience at one time a room may appear small and claustrophobic, while at another time it may seem cavernously large. At times the room itself may fade into insignificance if the attention of the observer is focused only upon the objects within it. The room itself has not changed, merely the perception of the observer. These shifts in room perception may be reflected analogously through shifting the parameters of reverberation.

Delay effects can be used to portray the visual trails that are described in hallucinogenic experiences. In an ASC experience, visual trails appear as an echoing of visual phenomena that creates a trail of repeated iterations of a moving object that follow the original source. Delay effects create corresponding sonic material.

Finally, sensory derangement can also be simulated through non-realistic use of spatial effects such as Doppler shifting; a sound source can be made to move unrealistically or erratically around the spatial field, reflecting the perceptual distortions that may occur in a hallucinatory experience.

Bass Drum, Saxophone and Laptop essentially adapts a live performance through the use of temporal processing. Use of processing described above is considered to relate to the perceptual distortions that may be experienced during a hallucination. In particular though, I wanted to develop a means through which the control envelopes for this processing change over time, as this corresponds with the principle of shifting perceptual effects.

The atomizer

Bass Drum, Saxophone and Laptop is preceded by the *Atomizer Live Patch*. In previous works, rapid rhythmic pulses were placed in circular motion within the auditory spatial field to create sound that is mimetic of the spiral, vortex and pin-point dots patterns of light experienced in psychedelic hallucinations. This technique is continued in *Bass Drum, Saxophone and Laptop* with the inclusion of a sampling module known as the ‘atomizer’, which was developed from the previous patch. The atomizer acts as a third method of sound generation, which can be triggered by either the bass drum or the saxophone.

Real-time interaction as analogous to organic process

We may presume that ASCs occur as a result of complex biological interactions; organic processes. Hallucinations can be considered as resulting from a complex interaction

between the human sensory system and the imaginative processes of the brain¹⁰⁹. To adapt the sound of the live instruments in accordance with this, the principle of organic mimesis is used in relation to the control envelopes parameters for effect processing.

The *Bass Drum, Saxophone and Laptop* software achieves an organic implementation of shifting DSP effects through a system that places the performers in an interactive relationship with the software. Three agents in this system are involved in an interactive process that happens in real-time; the sax player reacts to the drummer and the laptop, the drummer reacts to the sax player and the laptop, and the laptop reacts to both the drummer and the sax player. The laptop software expands this system of interactivity by manifesting an additional level of interaction between all three agents to produce the temporally shifting DSP processing and the introduction of additional sounds. The focus on spontaneous interaction between the three agents enables *Bass Drum, Saxophone and Laptop* to further the ASC analogy, because each performance evolves uniquely and organically. In the course of this article I shall demonstrate how this was realised.

Stimulus

The main inspiration for the choice of instrumentation came from a performance by John Zorn on saxophone with Z'EV on percussion at the Equinox Festival 2009¹¹⁰. Z'EV plays percussive instruments of his own design to create altered consciousness experiences through animist¹¹¹ trance drumming. Amongst his percussion was a large bass drum hung like a gong. I borrowed Z'EV's idea and hung a 26" marching band bass drum from a gong

¹⁰⁹ As indicated by Klüver.

¹¹⁰ John Zorn and Z'EV (Camden Centre, London: Equinox Festival, 2009) <http://www.youtube.com/watch?v=zLBG-9nEccY&feature=player_embedded> [accessed 3rd September 2010].

¹¹¹ Animism is a philosophical belief which asserts that animals, rocks, plants and other non-human entities can be considered to have a spirit or soul, as well as humans. Animism is discussed in Z'EV's article Z'EV 'We're the Earth with Spirit, We're the Earth with Soul', in *Equinox Catalogue: A Festival of Scientific Illuminism*, ed. by Salvatore Raymond Harmon and Mark Pilkington (Strange Attractor Press, 2009), pp. 74-80.

stand, in order to experiment with the enhanced droning resonance afforded by the gong mounting (the use of drones is discussed in earlier chapters).

The impulse to conduct these performances by exploring free playing is congruous with my comments above regarding live improvisation as analogous to ASCs. Free improvisational playing connects the music with the unpredictable variations of ASC experiences. Moreover the performance often rests tentatively upon the performers' memory of previous musical gestures and sounds. The spontaneous emergence of these during the course of performance can be considered as analogous to the emergence of images or events from one's past, which occurs in ASC experiences such as dreams.

One of the aims of the *Bass Drum, Saxophone and Laptop* project was to enhance an existing performance paradigm through the addition of live electronics. It is important to note that while the chosen instrumentation was considered suitable, the action of the software on these sounds could equally be applied to alternative instrumentation. The improvisational interaction of two performers and laptop is considered the most essential aspect of this project.

4.2 Software: Bass Drum, Saxophone and Laptop

The software Bass Drum, Saxophone and Laptop has been published as featured project 51 on the Cycling '74 website. <<http://cycling74.com/2010/03/05/project51-bass-drum-sax-laptop-patch/>> [accessed 3 September 2010].

The user interface of the patch is shown in figure 8. Figure 9 shows the operational concept of the software in the form of a flow chart. I shall proceed by explaining how each of the modules visible in figure 8 functions.

Sax input and trigger

Receives audio input from a microphone attached to the saxophone. A trigger is created from amplitude peaks that can be used to trigger the atomizer. This module can also play a pre-recorded sound file (such as a recording of a saxophone), which is used as an input for testing and demonstration purposes.

Sax effects rack

DSP effects rack with Doppler¹¹², ring modulator, filter, delay and reverb. This module processes the sound of the saxophone.

Drum input and trigger

Receives audio input from a microphone placed in front of the bass drum. A trigger is created from amplitude peaks that can be used to trigger the atomizer. This module can also use a pre-recorded sound file (such as a recording of a bass drum) as an input, for testing and demonstration purposes.

Drum effects rack

DSP effects rack with Doppler, ring modulator, filter, delay and reverb. This module processes the sound of the drum.

Atomizer

A sampling module that creates rhythmic sounds which reflect visual patterns of hallucination. Several banks of sounds are embedded in the patch. This module can be triggered by either the saxophone or the bass drum. When triggered, a sound is played at random from the selected bank as either a loop or a one-shot. The module has a facility to retrigger itself from a single trigger, based on a sequence of definable fixed time values. This allows a single trigger to cause a cluster of scattered rhythmic sounds. Controls are

¹¹² Doppler Effect implemented from a design by Rajmil Fischman.

provided to affect the speed/pitch at which the samples are played, turn looping on/off, set loop end-point, adjust volume, panning and a semi-random pitch bend.

Atomizer effects rack

DSP effects rack with Doppler, ring modulator, filter, delay and reverb. This module processes the sound of the atomizer.

Automation/control envelopes

Visible in the right hand side of the patch are the automation modules. These create control value envelopes based on various adjustable algorithms derived from the amplitude signal levels and the triggers of the saxophone and bass drum.

The standard trigger envelopes use the signal amplitude, and the amplitude at the point of trigger, to create control values that correspond to each instrument. These can be adjusted with offset, invert, attack and decay controls.

The sax scatter and drum scatter envelopes receive the corresponding instrument triggers. These are used to trigger a sequence of envelopes based on predefined time and amplitude values which are set with a graph. Each time the sequence is triggered, a series of envelope peaks will be produced in accordance with the predefined time and amplitude distributions of the graph. The speed at which the sequence plays can be adjusted, as can attack and decay.

The sustained playing envelopes create a ramped control value that ascends when a certain number of triggers are received within a time frame, and descends when a certain amount of time passes without any triggers. Put more simply; sustained playing is switched 'on' when it is persistently triggered as a result of continued playing from the performer, and it is switched 'off' when the performer stops playing. This creates a control envelope that

reflects prolonged playing on a longer time scale (unlike the other envelopes, which respond on a shorter time scale). Various parameters of this module are adjustable.

Finally there are four LFOs¹¹³ and four ‘drunk’ modules. These create automations independently of the instruments. The ‘drunk’ module creates a wandering control value using an algorithm integral to Max/MSP.

Patch bay

The patch bay provides a means by which any of the automation envelope control values can be assigned to any effect rack parameter for the sax, drum or atomizer, and several other parameters of the patch.

Mixer and audio output

This module mixes and pans the clean and wet signals for the saxophone, bass drum and atomizer. A facility is provided for recording the output as a stereo sound file or a multi-track sound file. The multi-track option allows further mixing of the sonic material after the performance for the creation of fixed recordings. Note that additionally, the clean sound files can be extracted and played back through the patch to experiment with different settings (useful for making new presets if extra performers are not available).

Demonstration sound files of a bass drum and saxophone performance are embedded in the software.

Presets

Presets enable all settings to be saved and recalled. Since there are so many possible combinations of assignments between automated control values and parameters, presets are essential for storing desirable settings and recalling them at a later date.

¹¹³ Low frequency oscillators.

Bass Drum Saxophone and Laptop Demo (3:00)

Bass Drum: Jonathan Weinel, Saxophone: Sol Nte.

This is a short video that demonstrates the performance system of *Bass Drum, Saxophone and Laptop* in action. Notice the movement of sliders and the red and yellow graphs on the laptop display in this video, which correspond with the instruments to affect the sound, along with the purple graphs that act independently of the performers. This video is an example of the system only and is not intended as a performance proper.

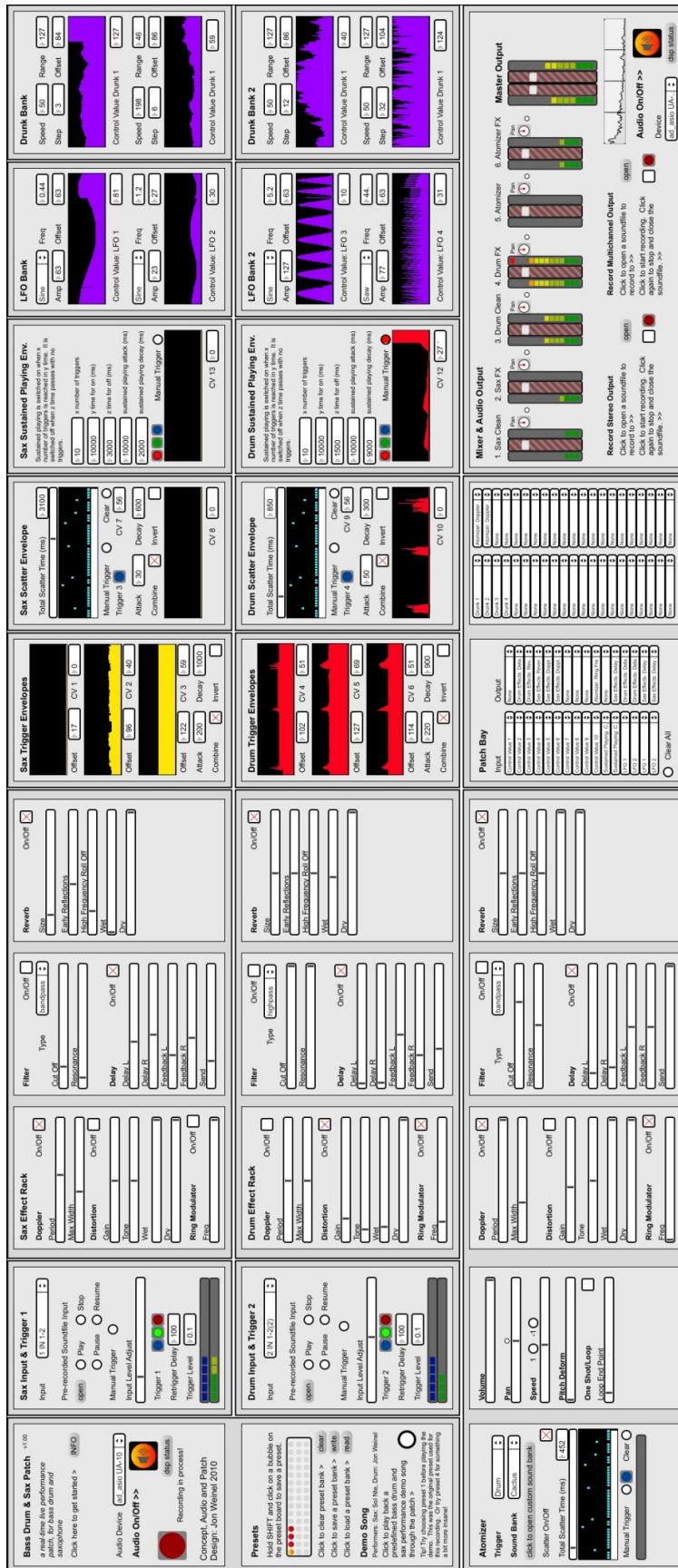


Figure 8. Bass Drum, Saxophone and Laptop user interface (previous page).

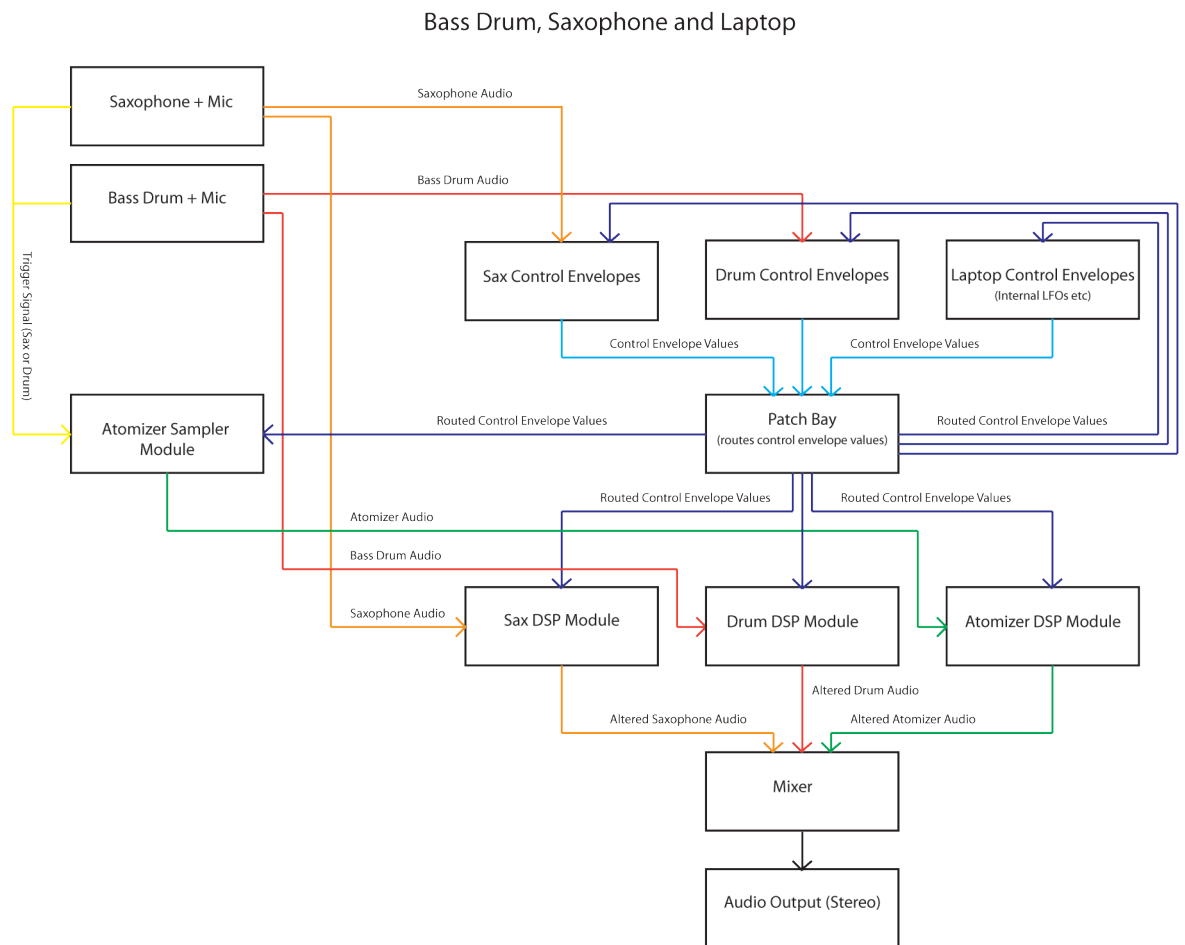


Figure 9. Flowchart showing the operation of Bass Drum, Saxophone and Laptop.

4.3 Performance

The patch was developed in parallel with experimentation of its use in performance. One of the advantages of the patch is the ability to store and recall presets. Over time I was able to identify some types of settings which were effective to achieve the stated aims than others, and in turn we were able to develop our improvised free playing together and with the patch.

Bass Drum, Saxophone and Laptop: 23rd February 2010, Session 1 (11:04)

Bass Drum: Jonathan Weinel, Saxophone: Sol Nte.

This is a recording from a live performance that was the most successful to date, in terms of performance and the presets used. I will examine the results that can be obtained with

the system more specifically by looking at some short audio examples from the February 23rd 2010 session recordings.

The atomizer module is first heard being triggered at 0:47. At 0:47 and 1:15 one can hear the atomizer becoming active when the bass drum hits the trigger peak, causing the scattered rhythmic sounds. In this section the drummer is deliberately playing beneath the trigger level for much of the passage, while playing louder hits to trigger the atomizer at certain points. As discussed previously, the scattered sounds are intended to reflect entoptic phenomena. Enabling the performer to control when these sounds occur allows sections of music that have no entoptic sounds, sections which are occasionally punctuated by entoptic sounds, and sections which are completely engulfed by entoptic sounds. In this way the performer is able to sculpt an ASC narrative that analogously reflects entoptic phenomena with varying intensity at different points in time. This is appropriate to ASC descriptions where entoptic phenomena gradually onsets, and may be more or less pertinent to the observer at different points in time. During the section of music heard from 1:45-2:35, the entoptic sounds can be heard with increased regularity, corresponding with the onset of prominent entoptic phenomena in an ASC experience.

From 1:26-2:35 the DSP processing on the saxophone can be heard shifting towards more extreme effects, as the loudness of playing increases on a sustained basis. Note that at the beginning of this section very little processing can be heard on the saxophone, but as sustained playing continues the amount of delay increases. The delay amount is being controlled by sustained playing of the bass drum. The bass drum control envelopes are also shaping the saxophone reverb: early reflections and Doppler period in this section. Delay effects and Doppler shift reflect a derangement of the senses, just as in an ASC experience one might experience blurred vision or reiterated trails of the same object. Reverberation creates an altered sense of the space within which the sounds are occurring.

Altering this sense of space reflects perceptual distortions to size; as if the room is irrationally becoming larger or smaller.

Changing these DSP parameters in time provides temporal organic transformations. These serve to reflect a sense of perceptual distortion that has varying intensity through the course of the ASC experience. Thus, at peaks of the performance such as 9:00-10:00, the amount of DSP processing, together with the triggered entoptic sounds, mimic the more intense parts of an ASC experience.

Throughout most of the composition the inherent droning qualities of the bass drum can be heard. These are augmented by the DSP processing, through the addition of reverb, distortion and ring modulator. This serves to pronounce the droning qualities, which are intended as with previous compositions such as *Night Dream*, to provide a sensory experience which reflects distortions to time perception. During sections such as 2:00-2:30, the drum uses hypnotic rhythms. In later sections of the performance such as 7:00-7:30, the rhythm becomes slower and heavier as the tempo changes. This is also intended to reflect distortions to time perception, where the length of time between each moment seems to last longer.

Additional examples

To show the range of the patch using different settings, I refer to two additional examples. These were recorded in a different session on the same day:

Bass Drum, Saxophone and Laptop: Extract 1 (0:59)

Bass Drum: Jonathan Weinel, Saxophone: Sol Nte

This audio example demonstrates the sounds that can be achieved with the bass drum, where some distortion, ring modulator and reverb are applied. The ring modulator

frequency is being controlled by the saxophone, creating frequency fluctuations that bounce up and down according to the saxophone playing. Some bleed from the drum into the saxophone microphone also affects this, depending on the physical proximity of the saxophonist to the drummer. Fluctuations of the ring modulator frequency cause changes in pitch to the sound of the drum. Since these changes are mediated by spontaneous forces from both performers, they achieve complex organic variations to the sound. This process is similar to the pitch fluctuations I discussed previously in relation to bass drum parts used on the composition *Night Breed*. The variations correspond with the concept of ASCs as organic processes, and are therefore appropriate to the mimetic design of sound processing for this composition.

Bass Drum, Saxophone and Laptop: Extract 2 (0:59)

Bass Drum: Jonathan Weinel, Saxophone: Sol Nte.

In the final example delay parameters of the saxophone (delay time and delay feedback) are controlled by the internal automation of the patch (LFOs and drunk values). Thus, delay and feedback are constantly shifting through the performance regardless of human performers, calling for them to respond to the laptop itself as the third agent. This addresses a problem that is apparent in *Bass Drum Saxophone and Laptop: 23rd February 2010, Session 1*, in which there is actually less variation during the intense sections of playing than would be desirable. This is due to limitations in the dynamic range of the microphone setup being used, which tends towards an on/off effect in the case of some DSP processing that is influenced by the instruments directly. Variations which are controlled by the patch (irrespective of the performers) serve to counter this, preventing static DSP settings which do not correspond with the concept of shifting ASC perception.

The February 23rd Session recordings exhibits a range of what the patch is capable of. The inherent droning qualities of the bass drum are enhanced by the patch to reflect the distorted time perception of ASC experiences. The Doppler effect creates interesting pitch variations on the saxophone, especially in combination with the delay and reverb effects. Scattered rhythmic sounds reflect visual patterns of hallucination. Temporal shifting of effect parameters of the three sound sources further the ASC analogy, as a result of the spontaneous interactions discussed.

4.4 Summary

The *Bass Drum, Saxophone and Laptop* software provides a means by which to facilitate a real-time performance that reflects altered states of consciousness experiences. This is achieved through the use of the atomizer module to reflect visual patterns of hallucination, and through temporal changes to the DSP effect processing for all sound sources. The analogy with altered states of consciousness is furthered by implementing these sound sources and processes in a system that responds interactively in real-time to each of the agents. This places an emphasis upon spontaneity of sound to reflect dreams and hallucinations as complex, unpredictable, organic processes.

One of the key benefits of the software is the automation, which enables performers to focus completely on their instrumental performance, while still maintaining dynamic control over the patch. This may also be an approach that is of interest to composers working on real-time projects unrelated to altered states of consciousness. The automation models could be improved by adding more ways in which the patch responds to a performance. For example, *Bass Drum, Saxophone and Laptop* follows signal amplitude and creates triggers from peak amplitudes. The means by which these peaks are identified

could be improved by using spectral processes¹¹⁴. Additionally, pitch convolution could be used to create envelopes based on pitch information.

A limitation of the software is that the correlation between the automation and DSP effect parameters does not always evolve with appropriate dynamic variation through the course of the performance. The sustained playing module was designed to address this problem; however it does so in a quite simplistic way. Similarly as discussed, the automated variations that the software produces in dissociation from the instrument amplitudes provide some further diversity. However since these are based on processes such as LFOs, this is not entirely satisfactory, as the envelopes do not fit with my discussion of organic transitions. A possible solution could be to add a greater level of dynamic response to the performers, or to implement a complex system of gestural recognition.

There are other ways in which a more dynamic progression through the performance could be facilitated. A foot switch could allow movement between presets, so that the performer can apply different settings for certain parts of a performance. Alternatively, an extra performer could control the software with a MIDI controller, remixing the performance in real-time. Another potential strategy could be to use a pre-recorded automation sequence that allows complex variation based on predefined control envelopes.

Though the limitations are apparent, *Bass Drum, Saxophone and Laptop* adequately demonstrates the concept of using real-time processing, in order to adapt a live performance in accordance with the concept of ASCs.

¹¹⁴ This is the process used by the third party object “bonk~” for Max/MSP. Note that at the time of writing this object was incompatible in the Windows operating system and Max 5 setup that I was using.

CHAPTER 5 - TINY JUNGLE

Psychedelic techniques in audio-visual composition.

*The video *Tiny Jungle* was presented at the forthcoming Noisefloor Festival, Staffordshire University, 2011. A paper based on this chapter was published in the proceedings of the International Computer Music Conference, University of Huddersfield, 2011.*

5.1 Background

Tiny Jungle uses the concept of a hallucinatory journey as a basis for audio-visual composition. The soundtrack is based upon electronic dance music, adapted in accordance with ASCs¹¹⁵. The visuals that accompany this composition are based upon many of the ASC features I have discussed throughout this study including entoptic phenomena, cellular and atomic forms, and organic aesthetics. A special piece of software was developed to produce hypnotic stroboscopic visual material in real-time, using Max/MSP/Jitter. In addition to the techniques discussed previously, I also utilised creative approaches from the animations of Harry Smith and the rave music video *Stakker Humanoid*. This chapter will discuss the development of *Tiny Jungle* from concept to technical realisation.

Hand-produced artwork

Tiny Jungle is informed by my past work within the visual arts, which was also based on psychedelic themes. Hand-produced artwork was seen as a means to achieve organic mimesis. Figure 10 shows an example of one of my pieces that is inspired by DMT

¹¹⁵ The compositions discussed in this commentary are presented chronologically. However it should be noted that the audio composition of *Tiny Jungle* was produced around the time of *Night Breed* and the other works discussed in chapter 1. This is highlighted to illustrate where the audio for *Tiny Jungle* fits within the development of my compositional process from a chronological perspective, as is noteworthy since the process of adapting electronic dance music is comparable to that used in *Night Breed*.

accounts. This work displays the cellular theme I have described previously. Although this is a work produced years before *Tiny Jungle*, the painting is background visual material for this project.



Figure 10. Jonathan Weinel, *Untitled DMT painting*, acrylic on board (2005).

Harry Smith

In order to develop visual material that corresponds with ASC experiences I utilised approaches similar to those used in Harry Smith's animated films, particularly *Early Abstractions*¹¹⁶. Smith's work is influenced by a range of sources including the occult, psychedelic and religious images, and can be viewed as 'visual music'. He spent time living among Native Americans, conducting ethnographic research and was familiar with peyote rituals. While making these films he was known to use drugs and sleep deprivation

¹¹⁶ Harry Smith, *Early abstractions, numbers 1-5, 7 & 10; mirror animations number 11* [dvd recording], (Santa Monica, CA: Harry Smith Archives, 2007).

as a means to induce visual imagery, which he would then attempt to incorporate into the animation. For the purposes of this study an in-depth analysis of the Smiths work is not necessary, except to mention the aspects that I have attempted to develop in my own work¹¹⁷.

In *Early Abstractions I* we can see many micro cellular and plant-like forms, as well as forms which suggest macro phenomena, such as orbiting planets or suns. The visual noise that results from the animation process he uses achieves a complex organic variation between each frame. Some of the forms he portrays seem to accomplish a sense of mystery or symbolism, since the movement and interactions that they undergo seems almost archetypal. For example, the motion of orbiting spheres could be suggestive of planetary rhythms, while the penetrative interactions of cell-like forms and their multiplication suggest biological procreation. This imagery could be interpreted as a display of archetypal patterns, rhythms and interactions of nature, and lends the film a mystical quality reminiscent of hallucinatory states.

Tiny Jungle attempts to incorporate some of Smith's approaches in *Early Abstractions I*. For example, I use hand-drawn artworks to produce organic visual material. I also use forms based upon the concept of archetypal rhythms or mysterious cosmic bodies.

Stakker Humanoid

Tiny Jungle also utilises a similar approach to rave music video *Stakker Humanoid*¹¹⁸.

This video uses a combination of stroboscopic effects and brightly coloured patterns providing a sense of hypnotic disorientation for the viewer. *Stakker Humanoid* has a

¹¹⁷ For further discussion of the life and work of Harry Smith see Andrew Perchuk and Rani Singh, *Harry Smith: The Avant-garde in the American Vernacular (Issues and Debates)* (Getty Research Institute, U.S., 2010).

¹¹⁸ *Humanoid - Stakker Humanoid*, 1989

<http://www.youtube.com/watch?v=l0Fg0QGRtnQ&feature=youtube_gdata_player> [accessed 27 August 2010].

digital aesthetic. To achieve a similar stroboscopic effect in *Tiny Jungle* I produced a Max/MSP/Jitter patch: the *Atomizer Visual*, which will be discussed later in this chapter.

Summary of project aim

Tiny Jungle develops creative approaches used in the films of Harry Smith and *Stalker Humanoid*. The work cultivates techniques borrowed from these forms, together with many of those discussed in previous chapters. The work uses these as a means to create materials that are based upon ASC features including entoptic phenomena, hypnotic disorientation, micro-macro, cellular, atomic and mysterious symbols and forms. It uses a combination of organic and digital aesthetics, corresponding with the concept of an ASC that involves interactions between organic and synthetic elements (such as hallucinations produced by synthetic drugs). Many different techniques are combined through montage to create an ASC narrative.

5.2 Audio Composition

Musically *Tiny Jungle* is an adaptation of electronic dance music. The piece draws from a variety of influences, most notably the drum & bass released by record labels such as Metalheadz and Reinforced during the 1990s¹¹⁹. The piece takes the typical rhythmic forms and structure of these types of music and creates an ASC version by using mimetic techniques based upon ASC features. This can be heard in the long introduction section that is common in drum & bass of this era (0:10-1:30). The syncopated rhythmic patterns that follow (1:33-2:05) are typical of this genre of music. The pitch bent bass sounds introduced at 2:26 are also common in this genre. *Tiny Jungle* uses electronic dance music forms and alters them to create an ASC version. In this respect it is similar to *Night Breed*, which I discussed in an earlier chapter.

¹¹⁹ For examples see Various Artists, *Metalheadz Presents Platinum Breakz* (FFRR, 1996).

Tiny Jungle uses droning sounds to reflect distorted time perception from 0:10-1:30.

While atmospheric synthesizer pads are common in the drum and bass forms that I was developing, I adapted the design of these using an organic mimetic process by producing these drones using real-time granular techniques. This achieves an increased organic fluidity than would be possible using quantised synthesizer pads (as would normally be the case in drum and bass).

The rhythmic sounds heard from 1:33-2:05 are constructed from organic source material. The wood sounds from *Night Breed* are used here, as opposed to the breakbeat¹²⁰ samples that would normally be used in drum and bass. Sounds which are reminiscent of birdcalls can be heard at 0:02-0:10 and 1:21-1:31. These are arranged into rhythmic patterns from 1:33-2:00, as well as elsewhere at other points in the composition. These sounds were the result of experimenting with organic pitch transformations (they are not actually recordings of birds). The accidental production of sounds that are reminiscent of birds triggered my imagination while composing to give the piece its title and narrative theme¹²¹. This theme is explored through the visual component of the composition, which depicts a visionary flight to a mystical jungle.

Tiny Jungle incorporates shifting perceptual transitions from 2:00-2:20. Here the rhythmic sounds disappear into a wave of entoptic rhythmic sounds. Entoptic rhythmic sounds can also be heard from 4:45-5:00.

The structure of the audio track is informed by Fischer's continuum (figure 1). The first half of *Tiny Jungle* (1:33-3:47) uses fast syncopated rhythms to reflect an ergotropic state, while the second half (3:48-6:10) slows the tempo of the music to a throbbing bass groove,

¹²⁰ Breakbeats as used in jungle, and drum and bass music are short percussive loops sampled from funk and soul music.

¹²¹ Note that the uses of mimetic animal sounds here also correlates with my previous discussion of traditional shamanic music, which often uses animal sounds to guide the ASC experience.

to suggest a trophotropic state. In this way the audio composition corresponds with the concept of an ASC which develops through ergotropic states of energy, through to trophotropic states which are more meditative. This provides a structure for the piece, which is also used as a basis for the visual material.

5.3 Visual Composition

Visuals help to create a narrative for the piece is based on the concept of a visionary journey or flight. In this section I will discuss the visual techniques used to reflect ASC features.

Organic mimesis

Tiny Jungle begins with a digitally manipulated clip of ink drops falling and dispersing in water (0:01-1:00). This was achieved by filming ink dripping into water with a digital camera (as opposed to attempting to recreate this digitally with particle effect simulators). The section that follows (1:00-1:30) features moving textures produced from scanned still ink images. These clips were produced by scrolling various ink images in different directions and combining them using layer blending effects. Using these techniques produces visual material that is mimetic of hallucinogenic episodes as an organic experience. This is achieved through the inherent complexity of image produced by the ink. The ink forms are predictable, to an extent, but are subject to complex natural variations that result from the expansion of the liquid on paper. This remains in keeping with my previous discussion of organic forms, as appropriate to reflect ASC experiences mimetically¹²².

¹²² It should be noted here that ink is not an organic material, but acquires natural variations in form that fit within my concept. This is similar to my use of metallic sounds as a non-organic material that acquires organic qualities, as discussed previously.

Entoptic phenomena

The visual patterns of hallucination that I have discussed at length in chapter three are achieved in *Tiny Jungle* using several methods. Firstly, I produced hand-drawn images of circle and dot patterns to achieve the organic aesthetics mentioned above, which can be seen at 1:00-1:30. These were animated using the *Atomizer Visual* software, and 3d layers in After Effects¹²³. During this passage we can also see this source material wrapped into a funnel shape, with the animated dot patterns coloured green.

Kaleidoscope transformation processes were used to produce the visual patterns of hallucination first seen at 0:15. This effect is produced in After Effects using the ‘CC Kaleida’ and ‘CC Flo Motion’ filters. These filters fold the source material into a grid, and then into a funnel, replicating the patterns of entoptic phenomena.

At 2:37-2:50 entopic phenomena are also described using 3D graphics produced in Maya¹²⁴. In this sequence a camera flies through a tunnel of 3d spheres to create another kind of entopic effect.

Mysterious forms

At 0:25 we see several orbiting spheres move across our vision. These are inspired by Harry Smith’s *Early Abstractions*, and are an example of mysterious forms. These images were created in 3d using Maya.

A moving head can be seen at 1:35 – 1:55. This clip is a simple animation created from a photograph and a moving background drawn with a wacom graphic tablet. Hand drawn artwork is once again used to achieve a form of organic mimesis. The head can be seen as a hallucinated entity, such as those described in ASC experiences.

¹²³ Adobe After Effects CS4, video compositing software. ‘3d layers’ describes the process of using two-dimensional layers of movies or images, which are moved three dimensionally in front of a perspective camera.

¹²⁴ Autodesk Maya 8, software for producing 3d rendered animation.

At 2:00 – 2:13 we see three ‘weird sticks’ and lizard-type creatures that move across the screen. These ambiguous cellular forms were also inspired by Smith’s work, and created using flash animation¹²⁵.

Hypnotic strobe effects

I created a software patch using Max/MSP/Jitter called the *Atomizer Visual* in order to animate stroboscopic material for the film. The aim of this material was to achieve disorientating visual rhythms. The user interface for this software is shown in figure 11. The software enables different still images or movie clips to flash up. Images are triggered according to a timed metronome. Once an image appears, it will fade out according to a specified decay time in milliseconds. The software allows up to four simultaneous visual channels to be combined. Blending of these channels occurs via selectable mathematical expressions. A simple usage would be to add the four channels so that four different images or movie clips flash on screen at different times, creating a hypnotic effect of different strobing images. Material produced in this way can be seen in the background throughout most of 2:27-3:47 (and through other sections of the movie).

The *Atomizer Visual* software runs at a resolution of 320x240 pixels, which enables the production of visual material to take place in real-time. The user drags image and video clips into the *Atomizer Visual*, records and recombines them in real-time. This is considered advantageous as a means to achieve organic mimesis, by enabling imaginative spontaneity to take place when inputting clips and source material.

Many of the algorithms that are used in combining clips produce visual glitch or noise effects. This is considered desirable, as it achieves an effect that is a digital equivalent to the visual noise seen in Harry Smith’s films.

¹²⁵ Adobe Flash CS4, software for creating 2d animation.

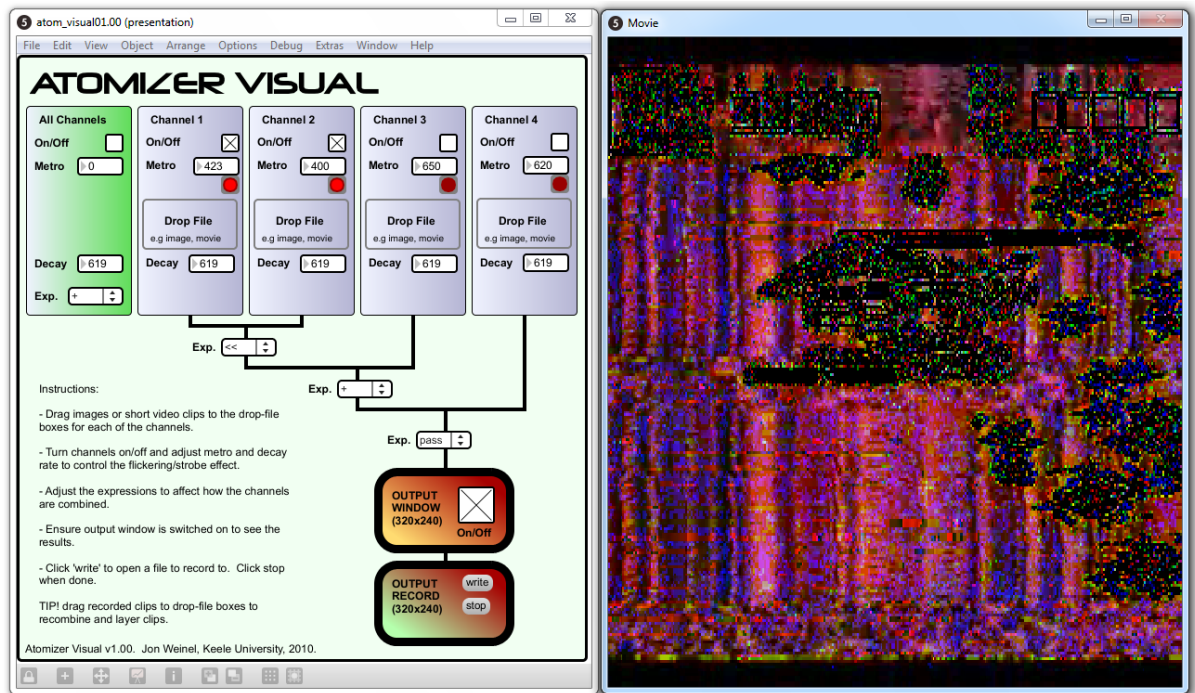


Figure 11. *Atomizer Visual* software user interface.

Visionary narrative

The visual materials used in *Tiny Jungle* are arranged to form a narrative structure. 3d animation produced in Maya, is used based on the concept of hallucinatory objects and scenes.

At 0:32 – 0:56 the camera flies above a barren desert landscape. Such flying experiences often occur in reports of hallucinations. The bird-call motif in the audio composition led me to imagine a visual scenario involving flight and trees.

We see a brief glimpse of mysterious forms that occur later in the video at 1:32.

A gyrating molecular model is revealed at 2:26. This describes Timothy Leary's concept of atomic electronic consciousness. The section at 2:37 – 2:50 sends a camera flying through a tunnel of spheres, which are based upon entoptic phenomena. Subsequently a mass of the molecules appears at 2:51.

The ‘tiny jungle’ described by the title of this work is seen at 3:08 – 3:30; the viewer is rushed through a disorientating mass of tree branches.

The pace of the music changes at 3:37, as the audio progresses through a bridge section that precedes the second half of the composition based on more meditative states. During these final sequences we are shown mysterious 3d objects that spin or pulse rhythmically. These are inspired by some of the hallucinated objects participants describe in DMT experiments. The room inside the spinning red spiked object is based upon the painting shown in figure 10. The black capsule shown at 5:11 is also a development of this painting. The mysterious white sphere surrounded by a pulsing diamond of spinning red tops visible at 5:22, can be viewed as an interpretive entoptic form¹²⁶.

The ending section at 6:11 see the camera fly back across the familiar desert landscape of reddish rock, while patterns of lights dance across the sky and a mysterious organic form twitches in the sky.

5.4 Summary

Tiny Jungle is reasonably successful as an exploratory work that uses a collage of different techniques to express in sound and vision many of the ASC features I have discussed throughout this project. The collage approach lacks aesthetic continuity in some ways, although this also creates some interesting juxtapositions. I am satisfied with the results but would consider exploring the use of either 3D or hand-drawn art for future works. The main achievement of *Tiny Jungle* is demonstrating a possible creative approach using ASCs as a basis for the design of an audio-visual work.

The *Atomizer Visual* software is an integral part of this project, enabling real-time production of stroboscopic visual material. This material assists in giving *Tiny Jungle* a

¹²⁶ Similar to my discussion of entoptic creatures earlier.

hypnotic and disorientating quality. There are many ways in which this software could be developed. Direct MIDI sync (instead of metronomes) would enable the visual pulses to directly match the rhythms of different parts of the music. A facility for live sketching with a graphic tablet could be implemented, where frames can be drawn by hand and then added into the film furthering the potential for real-time organic animation.

Tiny Jungle shows how ASCs might be used as a principle for adapting the design of an audio-visual composition. The next logical step could be to explore interactive 3D simulations that enable the participant to actively explore hallucinogenic environments.

Tiny Jungle gives a glimpse of how these interactive games might look, and how combinations of organic and digital graphical approaches might be employed.

Composing a multichannel piece of longer duration.

6.1 Concept

Nausea (19:12) is the final composition that I will discuss in this commentary of the creative portfolio. At nineteen minutes long the piece addresses the challenge of creating a larger-scale electroacoustic work that is based upon altered states of consciousness. The piece rounds off the portfolio by bringing together and refining many of the compositional approaches that are discussed throughout this commentary. Where *Nausea* explores new territory however, is in enabling the sounds to inhabit a longer compositional structure, which gives them more time to develop. Additionally the piece is presented in 5.1, which allows the entoptic sounds discussed previously to be developed in a multichannel environment.

Nausea borrows its title from the Sartre passage quoted in chapter one. This serves as a point of creative departure only; I imagined a hallucinogenic episode that has a predominantly menacing mood, with organic elements and digital synthetic ones (as might be fitting for a mescaline experience, under my previous discussion of the interaction between synthetic drugs in an organic human entity). The conceptual approach therefore bears some relation to *Nausea*, however it does not follow the text closely.

6.2 Compositional Features

Entoptic sounds

Nausea continues to use entoptic phenomena as a principle for the design of sonic material (or ‘entoptic sounds’ as I have termed them previously). This concept is explored in a

more diverse range of ways than in previous compositions: for example, using gated sounds (e.g. 0:20-0:30), using sonic material produced with the *Atomizer Live Patch* (2:30-2:40), using ring modulated sounds (9:33-9:43) and various reprocessed iterations of this material. Similar rhythmic material was also produced using a low-pass filter with a saw-tooth LFO controlling a filter cut-off envelope (5:00-5:10). This process was applied to various other materials used in the composition. Finally, the rhythmic approach of speedcore techno/flashcore is used: rapid bass drum patterns, which are used to analogously reflect entoptic phenomena, as discussed in previous chapters (5:10-5:20).

The entopic sounds are used in both ‘dark’ and ‘light’ sections of the composition (these sections will be discussed further in the structure section which follows). By ‘dark’ sounds I refer to combinations of sonic material with fast attack and decay envelopes, sometimes with distortion effects, such as those heard from 16:30-16:50. Usually these ‘dark’ sections will have lower spectral centroid, most notable in the bass drum sounds.

‘Light’ sounds refers to those sections which have higher spectral centroid, harmonic content and slower attack and decay envelopes, as heard at 0:20-0:50. These were achieved through techniques that included reversing sounds and processing them with a Watkins WEM Copicat Mk.IV tape delay¹²⁷. Tape delay was used as a means to create material that is mimetic of the perceptual distortions experienced during hallucinations; a common approach of dub music was used where delay feedback increases the amplitude of the signal with successive echoes. This technique was used to reflect non-realistic sound spaces, which was considered to suitably correlate with the ASC principle of perceptual

¹²⁷ Watkins WEM Copicat Mk.IV is a 1960s analogue tape delay unit with seven selectable delay configurations and feedback controls.

distortions. The ‘analogue warmth’ resulting from tape saturation¹²⁸ was also considered appropriate for these ‘light’ sections; ‘warmth’ and ‘light’ materials were chosen to correlate with the enhanced perception of these sensations that may occur during an ASC.

All entoptic sounds are spatialised in 5.1. It should be apparent from previous works that these sonic materials are a key feature of my compositional approach. As described previously, the design of entoptic sounds is based upon the spiral dot patterns of light perceived in hallucinogenic episodes. I have described earlier how these sounds are rotated spatially in accordance with the rotating funnels of entoptic phenomena. It was therefore a logical progression to attempt this in a multichannel context; indeed this is actually the main reason why the decision was taken to present the work in multichannel for this piece. All entoptic sounds are spatialised in various patterns of rotation. Although the technical realisation of this could perhaps be improved for future compositions¹²⁹, the results are satisfactory.

Drones

Drones are used in a similar way to previous compositions, and are considered as a means to reflect distortions to time perception. I use vocal drones during *Nausea*, since I have found that these work well for conveying distorted time perception. Vocal sounds tend to retain some recognisability even when time-stretched, which makes the distortion to their predictable form seem tangible (more than perhaps it might with other material where the source is less distinguishable).

¹²⁸ My discussion of ‘analogue warmth’ and tape saturation here refers to Hugh Robjohns, ‘Analogue warmth: the sound of tubes, tapes and transformers’, *SoundOnSound*, February 2010. <<http://www.soundonsound.com/sos/feb10/articles/analoguewarmth.htm>> [accessed 26th September 2011].

¹²⁹ Gary Kendall and Andres Cabrera discuss problems with rotating spatial effects: ‘Why things don’t work: what you need to know about spatial audio’, *Proceedings of the International Computer Music Conference 2011* (ICMA/University of Huddersfield, 2011), p.37. It is acknowledged that formats such as octophonic multichannel may improve the impression of rotational sounds for future compositions, however 5.1 was chosen for this piece to accommodate home listening (see p.23).

As with the entopic sounds, drones are used to provide material for light and dark sections of the imagined hallucinatory experience. At 2:30-2:40 we hear a yell-like drone, this is considered as ‘dark’ material. From 6:20-7:10 there is a female drone, which is used as ‘light’ material. From 12:00-12:53 there is a series of dissonant layered tones, produced from heavily time-stretched sounds that are used elsewhere. The amplitude of this dissonant section increases over its duration; this section is viewed as a material that is based upon the rising sense of unease, which might be perceived during a hallucination.

Bass sounds

Bass sounds are used, in order to reflect the physical sensations that may be experienced in a hallucinogenic experience (for example, 4:27-5:00). This use of low frequency material is similar to the implementations in compositions such as *Night Dream*, where bass is used in accordance with the physical sensations that may be experienced during a hallucinogenic experience. Bass sounds can be felt (as well as heard), particularly in concerts where the diffusion of the piece may be at higher amplitude levels. Low frequency materials are used during the sections of music where physical sensations might be more noticeable in an analogous hallucinatory experience. For the purposes of *Nausea*, this sensory material is conceptualised in relation to physical sensations of unrest that may accompany an ASC experience. Pitch transformations of low frequency sound are used in accordance with the ‘unrest’ that may be experienced during such states.

Whispered grains

Finally, whispered vocal sounds are used to reflect the presence of entities who speak a cryptic language, in the hallucination (for example 10:07-10:13). The whispering material is incomprehensible in its contents, but recognisable as whispering/mouth noises.

6.3 Compositional Structure

The compositional structure of *Nausea* is adapted in accordance with the concept of successive ‘waves’ of hallucinations. I have discussed previously the notion of hallucinogenic experiences that have a natural, organic onset, plateau and termination, which is mediated by human metabolism. The progression of these experiences can be conceptualised as ‘waves’. Participants in Strassman’s studies also describe ‘breakthrough’; the breaking through a section of the experience into another which is substantially different¹³⁰. The concepts of ‘waves’ and ‘breakthroughs’ are used as a principle for adapting the structure of the composition and arranging the sonic materials described above. ‘Waves’ refers to sections of music, which may gradually transition into each other, while ‘breakthroughs’ refer to rapid transitions, either between waves or within them. Figure 12 indicates the structure of the composition and the arrangement of sonic materials. Note that the wave sections have been indicated as discrete blocks to show the structure as clearly as possible, though in most cases a gradual transition occurs between sections.

¹³⁰ This process of breaking through is described in Strassman, p. 214.

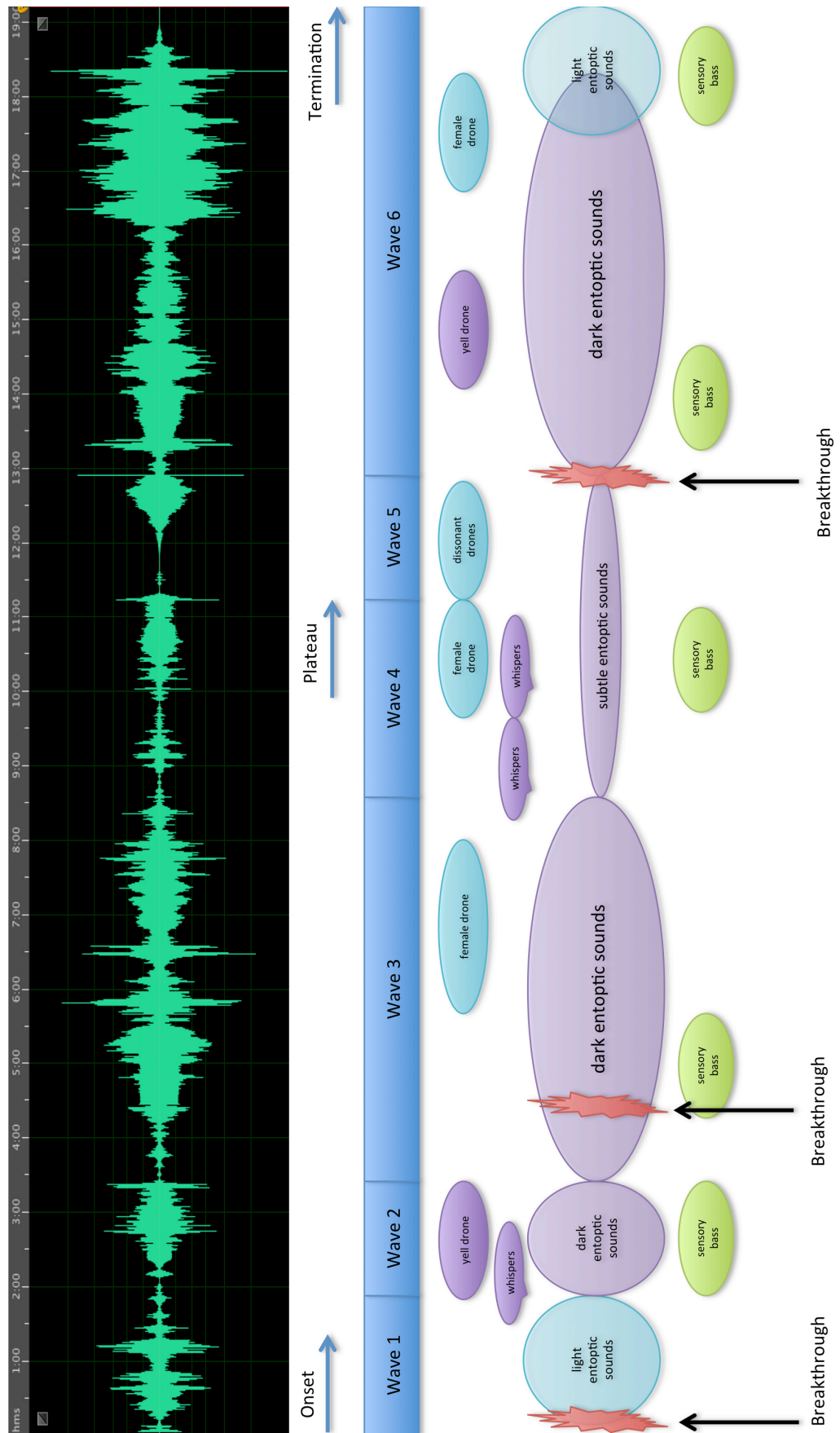


Figure 12. Diagram indicating compositional structure of *Nausea* (previous page).

Wave 1

At the beginning of the composition we hear the initial breakthrough (0:02-0:12), based on the initial onset of an ASC experience. From 0:10-1:45 we then hear the first 'light' wave. This gradually darkens over its course; an effect that is achieved through pitch shifting and filtering of the higher frequencies. This wave is based upon the concept of a relaxed and euphoric phase of an ASC experience; therefore the spatial rotation of entoptic sounds occurs more slowly than it does in subsequent sections that relate to hallucinations with greater intensity.

Wave 2

The section from 1:40-2:06 contains reverberating metallic sounds and whispering voices. These are based upon the concept of perceptual distortions, as may be perceived in an ASC. Reverberant sounds are used in correlation with the hallucination of a large physical space. From 2:06-3:25 bass sounds are introduced. These relate to the concept of physical sensations that may be experienced in a hallucination. A droning yell sound is also heard.

Wave 3

At 3:25 the next wave commences, using similar reverberating material and entoptic sounds which gradually increase in amplitude. At 4:36 'breakthrough' occurs, in accordance with the rapid transitions that Strassman's participants describe. Following this, sensory bass material and 'dark' entoptic sounds are used (for example, 5:12). This wave is based upon the concept of intense visual patterns of hallucination. In order to reflect this, entoptic sounds are moved in a circular motion with increased velocity than is heard in previous sections. Note that the entoptic sounds frequently use little or no reverberation. This corresponds with the close range positioning (for example, in the eye)

with which participants may perceive visual patterns of hallucination during an ASC. Various modulations of frequency are used so that the layers gradually morph between each other. This process is used in accordance with the concept of gradual shifts in perception, as discussed previously. At around 6:00, 'light' material is reintroduced to reflect the euphoric sensations that might be experienced during an ASC. This is accompanied by sensory bass sounds 6:50-7:00. The entoptic sounds return from 7:00-8:35.

Wave 4

Wave 4 commences as the entoptic sounds from the previous wave subside. Reverberating material (9:17), whispering voices (9:28) and subtle entoptic sounds are heard (9:44). Entoptic sounds created using ring modulator processing appear fleetingly with low amplitude levels. At 10:00 the vocal drone heard previously is reintroduced, accompanied by the sensory bass material. Wave 4 is constructed in accordance with the plateau phase of an ASC experience, where the participant may be transported to strange, mysterious spaces. This is reflected in the choice of sonic material by the use of whispering voices and reverberant material. During these phases, Strassman's participants usually describe having moved beyond the perception of entoptic phenomena as a dominant feature; likewise Klüver discusses the interpretation of entoptic phenomena as actual spaces, such as tunnels. In accordance with this, entoptic sounds are only present as a subtle feature of this section; instead voices are used in accordance with hallucinated entities, and reverberant sounds that result in a large, non-realistic space.

Wave 5

Wave 5 is designed in accordance with the concept of a rising sense of unease, as may be experienced during intense ASCs (11:20-12:54). A dissonant droning sound is heard which increases in amplitude.

Wave 6

A tearing sound is heard at 12:54; this is placed in accordance with the descriptions of ‘breakthrough’ in Strassman’s studies, where participants commonly hear a tearing sound at the point of breaking through. The final wave (12:54-19:12) builds intensity through successive layers of dark entoptic sounds and drones, culminating in intensity at around 16:28. Rapid rhythmic sounds and high amplitudes are used in accordance with the concept of an intense phase of psychedelic experience, which is accompanied by physical sensations that are analogously described using the ‘sensory bass’ material. During this section the circular movement of entoptic sounds occurs more rapidly than during previous sections, also in accordance with the concept of heightened intensity of an ASC. As in an ASC experience, effects gradually subside towards the end of the experience. During the passage from 18:10-18:28, filtering is used to reflect the subsidence of entoptic phenomena. Finally, the composition draws to a close with some final bass sounds, which are used in accordance with the concept of lingering physical sensations that may occur at the end of an ASC (18:28-19:12).

6.4 Summary

Nausea uses a similar compositional approach as *Entoptic Phenomena*, adapting the structure of an electroacoustic piece in accordance with the onset, plateau and termination of an ASC experience. The concept of a composition that is based upon the progression of an ASC experience in time was developed through the use of the ‘waves’ and ‘breakthrough’ concepts that I have discussed. These provide a useful means to conceptualise different sections of the music that are based upon the various physical and mental sensations, and hallucinatory illusions that one might experience during an ASC. This conceptual process assists with decisions regarding the arrangement of sonic materials.

The piece also explores the use of entoptic sounds in a multichannel context through spatialising the sounds in a circular, rotating motion. This approach was adopted to improve the correlation between the spiral funnels of dots that may be perceived during an ASC, and the spinning entoptic sounds that I have created for *Nausea*. The spatial impression of rotation is improved using multichannel sound, which strengthens the correlation with this ASC principle.

CHAPTER 7 - CONCLUSION

A summary of the compositional process.

7.1 Altered states of consciousness as an adaptive principle

During the course of producing the work contained within my creative portfolio, I have explored a variety of possible approaches for composing music that is based upon altered states of consciousness. Hallucinatory, altered states of consciousness have provided a basis for the design of sonic materials and the arrangement of these into musical structures. Below is a table summary of typical ‘ASC features’, corresponding ‘ASC techniques’ which I have used, and relevant examples from the creative portfolio¹³¹. I shall explain my framework for using these techniques in the section beneath. The creative approaches which I describe in this final chapter are not a definitive manual of techniques to represent altered states of consciousness, but demonstrate a possible approach for using ASCs as a basis for the design of electroacoustic compositions and related work.

¹³¹ Note that additional examples could be given for many categories, however in the interests of simplicity I have provided the examples where the use of these features is most pertinent, and is discussed in the corresponding chapters of this commentary.

ASC Feature	ASC Technique	Example
Cellular level consciousness.	Organic sonic material or transformations.	<i>Night Breed, Tiny Jungle.</i>
Atomic level consciousness.	Digital sounds/sonic atoms.	<i>Surfer Stem, Tiny Jungle.</i>
Shifting perceptual focus.	Morphing, texture blending.	<i>Night Breed.</i>
Distorted time perception.	Drone sounds.	<i>Night Dream, Nausea.</i>
Sensory level consciousness.	Physical bass drones, dub sounds.	<i>Night Dream, Swamp Process, Nausea.</i>
Micro-macro perception.	Juxtaposed macro drones and micro rhythmic textures.	<i>Night Dream.</i>
Onset, plateau and termination of an ASC, or ‘visionary journeys’.	Corresponding arrangement of materials, or narrative techniques.	<i>Entoptic Phenomena, Tiny Jungle, Nausea</i>
Imaginative spontaneity.	Real-time or improvised sound techniques.	<i>Bass Drum, Saxophone and Laptop.</i>
Visual patterns of hallucination (entoptic phenomena).	Entoptic rhythmic material.	<i>Entoptic Phenomena, Swamp Process, Nausea</i>
Other meanings in language, cryptic messages.	Processed vocal sounds.	<i>Entoptic Phenomena, Nausea</i>
Mysterious encounters with strange beings or entities.	Processed vocal sounds or corresponding visual forms.	<i>Entoptic Phenomena, Tiny Jungle, Nausea</i>

Concept and adaptation

The composition of most pieces began with a concept of an ASC experience, and an intention to adapt an existing compositional approach in accordance with this. For example, *Night Breed* uses the concept of an organic hallucination as discussed by Leary, which is used as a principle for adapting an electroacoustic composition that draws upon the approaches of electronic dance music. Others such as *Entoptic Phenomena* or *Nausea* use the concept of an ASC experience with an onset, plateau and termination, which is characterised by the perception of visual patterns of hallucination, and ‘breakthrough’ phases where one may perceive strange entities and distortions to time perception. This concept of an ASC experience provides a set of principles for adapting the familiar approaches of electroacoustic music, which rely on digital manipulation of audio. In the case of *Tiny Jungle*, the concept of an ASC experience as a visionary flight or journey is

used. This informs the adaptation of audio-visual materials. Therefore we can summarise that the composition process usually begins by considering two factors:

1. What is the concept of an ASC experience being used?
2. What is the compositional approach that will be adapted?

The concepts of ASCs used have drawn selectively from various studies and accounts of hallucination experiences. These have provided a conceptual approach upon which to base the design of sonic materials and musical structure. The compositional forms that I have adapted are predominantly electroacoustic, however they also draw upon electronic dance music. It is acknowledged that the general process described could be applied to adapt other forms of music, however it is my opinion that digital audio is particularly appropriate for designing sonic materials that are based upon ASCs. For example, where hallucinations may contain the perception of buzzing noises or whispering voices, these can provide a basis for producing corresponding sonic material.

Mimetic sonic material

The table above provides a list of ASC features, which are used as basis for the design of mimetic sonic material. To recapitulate: ‘mimetic sonic material’ refers to sounds which are adapted to imitate certain aspects derived from the typical form of an ASC experience, through the choice and manipulation of digital audio. The portfolio of compositions explores mapping these ASC features to sound in a variety of ways. ASCs may contain cellular or organic characteristics, in terms of hallucinated visions, or their occurrence in the human organism subject to factors such as metabolism. This principle can be used for the design of corresponding sonic materials which have a predictable form, characterised by complex natural variation. This can be used as a basis for the choice of source material, such as in the pieces *Night Breed* and *Tiny Jungle* where organic, natural wood sounds are

used as percussion. It can also be used as a basis for adapting transformative envelopes, as used in *Bass Drum & Saxophone*. The software used for the realisation of this piece maps amplitude dynamics of the acoustic instrumentation to DSP control envelopes; thus using the dynamics as data with complex variation, to produce organic control envelopes.

Other ASC features were also used to inform the choice of corresponding sonic materials. For example: drone sounds relate to distortions to time perception, bass sounds relate to heightened physical sensation, circling rhythmic sounds relate to visual patterns of hallucination and whispering voices relate to the perception of strange beings. Similarly, ASC features can be used as a principle for manipulating the chosen materials. For example: morphing transitions between sonic materials correspond with the shifting perception or attention that is described in hallucinatory experiences.

In each case the techniques employed depend upon the familiar methods of sound generation and processing used in electroacoustic music. However, the usage of these has been adapted to produce material that corresponds with the typical features of an ASC experience. This is not arbitrary; though rapid rhythmic sounds are common in other compositions, their use is adapted in accordance with ASCs in compositions such as *Nausea*, where spatial rotation and speed relates to ASC experiences of visual patterns of hallucination. The concept of ASCs informs the choice of sonic materials, and the manner in which they are manipulated; if a concept other than ASCs were used, these choices would likely be approached in an entirely different manner. Indeed, though the essential techniques of manipulating digital audio are familiar, it has been necessary to develop new software tools such as the *Atomizer Live Patch* to adapt their specific use. The relationship of ASC features to compositional design is also strengthened by the use of musical structures that are based upon ASCs, as I shall discuss next.

Mimetic compositional structure

The contextualisation of the sonic materials and transformation discussed above has been informed by the manner in which ASCs progress through time. An early composition such as *Night Breed* makes minor adaptations to a structure derived from electronic dance music; morphing effects and transformations are used to correspond with the idea of a hallucinated underwater environment. Yet *Night Breed* mainly explores adaptation through the development of organic sonic materials; ASCs do not substantially affect the macro structure of this piece.

The use of ASCs as a basis for compositional structure is particularly evident in later works, notably *Entoptic Phenomena*, where the arrangement of sonic materials is closely based upon the concept of a DMT hallucination of the type described by Strassman's study. The structure of this piece is based upon the rapid onset of visual patterns of hallucination described by Strassman's participants, and 'breakthrough' from the perception of these to hallucinated spaces occupied by strange beings or entities, before the experience gradually subsides. This concept informs the musical structure, which is realised through the use of entoptic sounds and drones (for example). Thus the onset, plateau and termination of the composition relates to the progression of a DMT experience in time; the typical features which one might perceive as such an experience progresses are used as a basis for the arrangement of corresponding sonic materials.

A similar approach is used in the final composition: *Nausea*. *Nausea* develops the structural approach of *Entoptic Phenomena* by adopting the concept of 'waves': different characteristic phases of a hallucinatory experience that can be used as a basis for corresponding musical sections. Through the discussion of *Nausea*, I have therefore been able to demonstrate a possible approach through which ASCs can be used as a basis for designing complex musical structures of longer time duration.

The imagination

The role of the imagination in the creative process should not be overlooked. Since dreams and hallucinations can be considered to enhance the production of imaginative visual material generated internally within the brain, it is possible to consider that visualisation and imagination are important factors affecting the creative process. According to Fischer, imaginative creativity is a type of mild ergotropic state (figure 1). While it is beyond the scope of this research to consider the neurological basis for this, we may speculate that through creative imagination, the composer is able to peripherally access a similar source to that from which dreams and hallucinations are produced. In simple terms: dreaming involves the imagination, hallucination involves the imagination, and creativity involves the imagination. While the techniques I have described provide a framework for creating an ASC composition, the process of imagining how a hypothetical hallucination might be experienced is evidently also part of the process (especially because none of the works are based exclusively on a single text or ASC account). Likewise, when choosing from a selection of similar materials (for example, drones), the decision depends upon the subjective judgements of musicality (i.e. which drone sounds most musical). These somewhat ephemeral judgements are considered to be consistent with the process of making compositions that are based upon ASCs.

Techniques for audio-visual and interactive artworks

I have provided a summary of techniques that I have used for designing sonic materials and structure in accordance with ASC states. In many cases similar processes can be applied for the design of visual materials. For example: visual patterns of hallucination can be used as a basis for the design of related visual forms. The perception of strange entities or mysterious forms can be used as a principle for designing corresponding visual shapes. Some of these approaches to visual material are demonstrated by the composition

Tiny Jungle. This work suggests that further research would be beneficial to develop the use of both sonic and visual materials (and the interaction between the two) in relation to ASCs.

7.2 Conclusion

Through the course of this commentary I have discussed the development of a compositional process that uses hallucinatory ASCs as a basis for adapting the design of sonic materials and compositional structure. The process used is not prescriptive, or definitive, though it is hoped that I have shown a clear correspondence between the principles used and the sounds produced. Moreover, I hope that I have demonstrated that this is an approach which is useful for the design of electroacoustic music, and which has the potential to result in some interesting music. Certainly it would be possible for other composers to adopt a similar approach, perhaps creating a different set of correspondences in accordance with other typical features, or varieties of ASC that my study has not focused upon (e.g. states of meditation), or through further development of the principles that I have proposed¹³². As discussed, the process of adaptation that is explored in this commentary could also be applied to other types of music. Alternatively, composers may decide to use ASCs as a basis for compositional methods that are entirely different to those discussed here. In any of these cases I hope that this commentary and the creative portfolio have made a useful contribution to issues relating to ASCs and musical composition, as well as discussions relating to the composition of electroacoustic music generally.

As discussed in chapter 1, it has been beyond the scope of this research to measure audience reactions or interpretations of this work. Nonetheless in terms of discussions by

¹³² For example, some principles from the ‘ASC features’ list in chapter 1 were not used to develop corresponding sonic material. ‘Ego loss’, for example.

DeNora¹³³ and Kendall¹³⁴, electroacoustic music may be considered to afford the perception of imaginary or non-realistic spaces and journeys. In these terms, ASCs provide a useful basis for the design of electroacoustic compositions; through the use of digital audio we can attempt to create journeys through illusory spaces that are analogous to hallucinations. As Kendall notes, it is likely that audience interpretation will arise through a combination of common interpretations of sound (for example, spatial use of audio is likely to achieve some degree of similarity in interpretation) and the unique response of the individual. Unless it is suggested through programme notes, it is quite possible that listeners of these compositions may not conceptualise them as ‘psychedelic’ or ‘ASC’ music. However, it is also possible that the listening experience affords a journey through illusory sonic spaces. This would correlate with the compositional intention, since the musical results are more important than their association with labels such as ‘psychedelic’ or ‘ASC’. Yet the principle of ASCs provides a useful means for the composer to conceptualise the design of such a journey through sound.

To provide a visual arts analogy: if one saw a painting based on the entoptic patterns shown in figure 3, as is shown on the cover of this commentary, we do not necessarily know how it would be interpreted. Similarities with other artworks from psychedelic culture such as those discussed by Rubin¹³⁵ might suggest a related interpretation. Or we might be able to influence the viewer by using a caption or telling them the basis for the artwork. However it is equally possible that he or she might have no idea that the painting was based upon visual patterns of hallucination. Nonetheless, it might be appreciable without this background knowledge, if we enjoy the colours, the shapes and the form. The same can be said of the musical compositions contained within this portfolio.

¹³³ DeNora, pp.21-45.

¹³⁴ Kendall, pp.231-233.

¹³⁵ Rubin, Morgan and Pinchbeck.

This section notes some other areas of interest that I was not able to explore fully during the course of this study. These are areas that may be explored in future work:

Detailed survey of existing ASC composition

The brief notes on psychedelic art which I gave in the first chapter of this commentary were sufficient to commence work in developing compositional approaches related to altered states of consciousness. Nonetheless, a much more detailed survey of existing ASC artworks and techniques from modern and historical examples would be most useful. Such a survey could analyse the various approaches used to signify the psychedelic experience in greater depth. This research was beyond the scope of my project, but would be a worthwhile future area to investigate.

Philosophy

There is a wealth of philosophical thought that relates to both music and ASCs. It has been beyond the scope of this research to consider the purpose of creating music based on ASCs, from a philosophical perspective, however this is a possible area for future discussion.

The occult

Creative practices that relate to studies of the occult often take into account ASCs. There may be an avenue of investigation that develops this work in this direction, considering aspects of ritual and performance that connect ASCs and occult studies.

Animism

Shamanic belief systems and trance cultures are often animist. I have only mentioned animism in passing during this study in relation to Z'EVs music. My ASC features list

notes perceptual effects that suggest animist interpretations; the personification of ‘inanimate’ objects for example.

Noise

Although this was not the approach that was taken with this work, noise could be considered as a suitable approach to reflect ASCs in music. Where noise is used as an irrational musical force that is the antithesis of rational musical order, it is perhaps an appropriate means to reflect ASC perception. This is discussed in Marie Thompson’s paper¹³⁶. A related idea to this is that noise could enable the possibility for us to perceive patterns within it. The concept is similar to looking at TV static and perceiving shapes within it. The same is perhaps possible with noise, which means it could be used to reflect the pattern perception ASC feature in my list.

Outer space

Western psychedelic music often uses an exotic approach to sound. These exotic sounds range from samples of sitars to sounds from science fiction movies, perhaps suggesting idealised alternatives to normal consciousness and ways of living (e.g. Eastern philosophy, utopian space worlds). The use of cosmic themes to reflect altered states of consciousness is not covered by this study.

Music therapy

Although this is not discussed in my thesis, it is possible to speculate that future developments of this work may have applications for music therapy. Leary’s work indicates the potential therapeutic benefits of ASCs. If it were possible to create music that produces similar effects, this might offer some benefits for music therapy. However this is

¹³⁶ Marie Thompson who argues that music is sublime and equates with reason, whereas noise is abject and equates with madness. Marie Thompson, ‘Noise Music, Marginality and Madness’, presented at the “*Bigger than Words, Wider than Pictures*”: *Noise, Affect, Politics* conference, University of Salford, 2010.

unproven; the approach taken with this work was only to use ASCs as a basis for the design of compositional materials and structures. The extent to which the music discussed in this commentary can be considered to produce an ASC for the listener is untested.

Interactive artworks

Tiny Jungle explored the concept of altered states of consciousness within audio-visual media. This demonstrates how some of the principles used for creating musical compositions can also be applied to visual forms. Future work could explore the idea of ASCs through video games and interactive simulations¹³⁷. A possible approach in this area would be to use a map of ASC states (such as those produced by Fischer or Hobson) as a set of principles for manipulating game parameters. Most video game engines at present use a camera to represent the player character's perspective in the first person. However, we can conceive of a game engine that provides a complete model for the characters' perceptual experience of the virtual environment, affecting the way they see and hear everything around them. Certainly this could provide interesting gaming experiences that take ASCs into consideration. It could also have practical applications for use in training simulations: in scuba diving nitrogen narcosis can cause dangerous ASCs. Implementing ASCs into a diving simulator might help to alert trainee divers of the risks. The hypothesised technology could also be used as a basis for developing interactive psychedelic artworks.

¹³⁷ I have carried out some initial work in this area: Jonathan Weinel, 'Quake Delirium: Remixing Psychedelic Video Games' *Sonic Ideas/Ideas Sonicas* 3 (2) (CMMAS, 2011).

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