

Entoptic Phenomena in Audio: **Categories of Psychedelic Electroacoustic Composition**

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Altered states of consciousness are perceptual states such as dream, delirium or hallucination that fall beyond a commonly accepted normal waking consciousness. This article discusses Entoptic Phenomena in Audio; a collection of four electroacoustic compositions that are based upon the author's research regarding these states. The compositional process utilised involves consideration of the typical features and structure of hallucinatory experiences, as described by participants in psychological studies and other available literature. Typical features of hallucination are then used to indicate the design of corresponding sonic materials, and the structure of the composition. This compositional process is described in detail, leading to a generalised structural approach for creating electroacoustic compositions based on altered states of consciousness, with several possible variations. In addition, the decision to present the works on 12" vinyl is also discussed, as are the ways in which this project interfaces with electronic dance music culture.

Keywords: Electroacoustic music, altered states of consciousness, electronic dance music, vinyl

Introduction

“...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.” (Strassman, 2001, p.148)

“The sound [in my head] was like the most beautiful music I have ever heard, although it had no melody, just rapidly changing pitches and tones” (Weinel, Cunningham & Griffiths, 2014, p.4)

Altered states of consciousness (ASCs) are perceptual states that fall outside of a commonly accepted normal waking consciousness; accepting the limits of such a definition. The term came to prominence in the 1960s, most notably with Charles Tart's *Altered States of Consciousness: A Book of Readings* (Tart, 1969), in which Arnold Ludwig provides a detailed definition of the mechanisms that produce ASCs and their principal characteristics (Ludwig, 1969). ASCs can result either voluntarily or involuntarily through various means, such as may occur in situations that deprive

or focus the sensory system to an unusual degree, or alter its basic functioning due to physiological changes or drugs. For our purposes here, the hallucinations caused by psychedelic drugs such as LSD, mescaline, psilocybin mushrooms or DMT are of primary interest. During these states, an individual may experience a range of effects that impact their sense of self and interaction with the world. Among these effects, an individual may experience substantial change to their subjective sensory experience of the world; hallucinations of the visual (sight), auditory (hearing), somatic (body), gustatory (taste) or olfactory (smell) senses may occur.

During hallucinations changes to visual and auditory perception may affect perception, either by altering the awareness of what is really there, or by causing the individual to see or hear things that do not really exist in the external physical environment. For example, Heinrich Klüver's research regarding the experience of mescaline participants revealed the common perception of 'form constants': grid, lattice and funnel-type patterns which those under the influence of the drug would commonly see (Klüver, 1971, p.66). These patterns do not really exist in the external environment, but are perceived due to the action of the drug and its effects on the visual system of the individual. Similarly, auditory hallucinations may occur. These may consist of various noises, voices, tones or music that have no acoustic origin in the external environment (Weinel, 2013).

ASC experiences of this kind can be considered in terms of Allan Hobson's 'state-space' concept, which considers consciousness in terms of an 'Activation, Input, Modulation' (AIM) model (Hobson, 2002, pp.44-46). According to this model, 'Activation' describes the level of brain activity in a given situation; when in waking conscious states, activation is likely to be high, while in dreamless sleep states activation will be low. 'Input' describes the exchange of information between the external environment; in waking states, information is exchanged with the external world via the senses, while in states of dreaming input is received internally. 'Modulation' deals with how the brain interacts with memory and records information.

Under Hobson's AIM model of consciousness, the state of consciousness of an individual changes throughout the day during the typical cycle of waking consciousness and NREM (non-rapid eye movement) and REM (rapid-eye movement) sleep. The Input axis of this model is of particular interest to our discussion, since it allows us to clearly distinguish between internal and external sensory experience, where the visual experiences of dreams or hallucinations (internal input) are clearly distinct from those received from the external environment (external input). Likewise we can distinguish between auditory experiences that result from stimulation of the senses from external physical sources in the environment (acoustic vibrations) and auditory experiences that have no external origin, but are nonetheless experienced as sounds heard 'within the head'.

Much of my compositional work over recent years has utilised this notion of internal sensory experience as a basis for the design of music and audio-visual artworks. The accounts of visual and auditory hallucination that are found in the associated literature describe interesting subjective experiences. One of the premises for my research is therefore that we should seek to explore methods through which these experiences can be translated in to works of art and music. Hypothetically it should be possible to

recreate the visual or aural components of a hallucination by using computer graphics and audio. This is worthwhile from a philosophical point of view, in order to communicate the contents of these experiences, and in order to further knowledge of the capacity for such experiences that is inherent within all of us. Moreover for our purposes here, these experiences may also provide an excellent basis for works of art and music.

The compositions contained within the *Entoptic Phenomena in Audio* vinyl (Figure 1) provide a small step towards this goal. The title of the record relates to the term 'entoptic phenomena', which has been used by authors such as Lewis-Williams and Dowson (1988) to describe the visual experiences 'within the eye' that occur during hallucination. In this article I shall discuss the compositional approaches utilised on the record, through which I have developed new approaches for representing ASCs in music. Through discussion of these works we shall then be able to consider a general approach to composing electroacoustic music based on ASCs, where sonic materials and structure are analogous to experiences of hallucination. Within this approach there are several variations that could be taken, indicating four main 'categories' of psychedelic electroacoustic composition.





[FIGURE 1a] [FIGURE 1b]

Figure 1. *Entoptic Phenomena in Audio*, as presented on limited edition transparent orange vinyl. The label artwork (a) is a painting by Weinell, which is based on Klüver's form constants.

Adaptive Principle

The compositions contained within *Entoptic Phenomena in Audio* (Weinell, 2014) are fixed media stereo electroacoustic compositions that evolved through the praxis of my PhD research regarding altered states of consciousness as a principle for composing electroacoustic music. The pieces were originally composed from 2007-2009 and have been widely performed at events such as the *International Computer Music Conference*, including a performance at the ISSUE Project Room in New York City in 2010 (Weinell, 2010). As the project developed the compositional approach evolved, however all pieces can be considered in terms of what I refer to as an 'adaptive principle'. This 'adaptive principle' refers to the approach of taking an existing compositional paradigm, and modifying one or more aspects of its implementation in order to reflect altered states of consciousness in some way. All the pieces on *Entoptic Phenomena in Audio* can be considered in these terms since I am working within the general compositional paradigms of electroacoustic music and electronic dance music, while adapting the typical approaches of these in order to reflect ASCs.

In order to explain how this process works more clearly, let us consider some examples. Firstly, let us suppose that someone chooses to paint a watercolour painting of a hallway scene. This method draws upon the standard approaches of watercolour painting; the basic toolkit of brushes and paints, and the stylistic

approaches are well established. The scene may be rendered with a certain degree of realism. Now suppose that this same scene is painted as it may appear subjectively to someone during a hallucination. We know from studies such as Klüver's that geometric patterns may be visible; proportions may seem distorted; and colours may seem more intense. Therefore, when painting the scene, we may begin to incorporate these features into the painting. The same basic approaches of watercolour painting are used, but the usage of these is adapted in order to render the scene as it may appear during a hallucination.

In musical composition, a similar approach can be taken. Typical compositional tools and approaches may be used, but the use of these may be adapted in order to reflect ASCs in some way. Indeed, we may consider that this is the approach used in 1960s psychedelic rock music, such as can be found on the *Nuggets* compilations (Stewart & Kaye, 1998). Most of the psychedelic groups from this era utilised a basic approach that was derived from electric blues and rock n' roll music. The instrumentation, verse-chorus structures, chord progressions and tonalities were usually fairly typical of rock n' roll bands of the time. So what makes the music psychedelic? Aside from the cultural context in which the music was presented and performed, there are several key features present on these sound recordings that indicate psychedelia.

Firstly, lyrics may discuss themes broadly related to psychedelic culture; notions of hallucination, dreaming or the unconscious. Songs such as the Electric Prunes' *I Had Too Much to Dream (Last Night)* (Tucker & Mantz, 1998), Jefferson Airplane's *White Rabbit* (Slick, 1967), or Amboy Dukes' *Journey to the Centre of the Mind* (Nugent & Farmer, 1998) are examples; the lyrics of these songs discuss themes related to hallucinations, psychedelic culture or consciousness expansion.

Additionally, the use of effects processes is often pronounced. Tremelo, reverb and flanger effects are often used to alter the sound of the guitar or other instruments, in order to evoke a sense of perceptual distortion. The Electric Prunes' track exhibits this; the guitar sounds are heavily modified, and reverb is used to fade the singers voice out at the end of verses. This induces a dreamy feel to the actual production of the music; the music sounds as it might do if actually experienced in an altered state of consciousness.

In some cases tape loops and reversed material are also used; The Beatles' *Tomorrow Never Knows* (Lennon & McCartney, 1966) is an example of this. In the context of the song, which adopts a psychedelic theme by adapting Timothy Leary's *Psychedelic Experience: A Manual Based on the Tibetan Book of the Dead* (2003), the looping tape sounds, drones and reversed material can be taken as corresponding to the notions of timelessness or cyclical views of time. Recorded material flows backwards and loops over, reflecting the notions of cyclical existence that are present in the lyrics. On other tracks such as Jimi Hendrix's *And the Gods Made Love* (1968), a similar approach is used by manipulating tape speed in a manner similar to music concrete. In these sections time flows, but it does not flow forwards in the usual linear fashion. This can also perhaps be viewed as relating to notions of otherness or spiritual experience, by distorting time; a feature which also occurs during ASCs (Ludwig, 1969, pp.13-14).

In summary then, one way of viewing 1960s psychedelic rock is as a compositional form primarily based on rock n' roll, but which adapts the musical design through various approaches that reflecting ASCs. These may include: psychedelic lyrical themes; the use of effects processes that suggest altered perceptual states; the use of tape to perform time manipulations; or others. The use of sound to reference the psychedelic experience could be considered in terms of Simon Emmerson 'mimetic discourse', which describes the signifying potential of sound that results from referential or extrinsic qualities (Emmerson, 1986). Each of these adaptive approaches suggests notions of hallucination or psychedelia, but they do not constitute the underlying musical approach, which resides within the general paradigm of rock n' roll music.

A similar 'adaptive principle' can also be used in electroacoustic composition, and is the main process used in the four compositions contained within *Entoptic Phenomena in Audio*. I will now discuss these pieces, in order to explore how the concept of ASCs can be used to adapt certain aspects of the compositions. With each of these pieces my compositional approaches developed, ultimately leading to a cohesive structural approach that I shall detail later on in the article.

Compositions

Night Breed

Night Breed (6:23) was the first composition produced as part of my PhD work, which utilises the concept of ASCs as a basis for musical composition. The piece utilises typical approaches of electroacoustic music and electronic dance music, but adapts these in order to reflect ASCs in certain specific ways.

Considering first the salient electronic dance music features of the piece, *Night Breed* uses rhythmic forms that are typical of jungle, techno or dubstep. For instance, the 4/4 bass drum rhythms introduced at 1:00 are influenced by techno and the section from 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. However, certain aspects of these are adapted in order to reflect ASCs. This is approached through considering 'ASC features': typical features of an ASC experience, which are then used as a basis for corresponding compositional techniques that are related to those features.

In order to acquire these 'ASC features', for *Night Breed* I utilised Timothy Leary's discussion of ASC in *The Politics of Ecstasy* (1998). Within this, Leary discusses his 'seven levels of energy consciousness' model of ASCs, which describes what Leary sees as key features of different types of ASC. In particular, the concept of 'cellular level consciousness' is described, which Leary describes as being elicited by drugs such as Peyote or Psilocybin mushrooms. According to Leary 'cellular level consciousness' reveals the biological existence of life to the individual, including 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 or evolution, says Leary.

Utilising this concept, for *Night Breed* I considered ‘cellular level consciousness’ as an ASC feature, and attempted to incorporate this into the design of the composition by utilising ‘organic’ approaches to the composition of sounds and their arrangement. The concept of the ‘organic’ is incorporated into the design of the piece in several ways. Firstly, ‘organic sound materials’ were used. For the percussion sounds, instead of using the synthetic drum machine sounds that are typical of techno music, natural sounds such as percussive wood sounds were used. These have a predictable time-varying spectral form that is characterised by complex subtle variations in timbre caused by the interaction of the materials. The use of the human voice can similarly be considered as organic sound material. These sounds, which can be heard from 0:45 onwards, can be considered as mimetic of organic natural forms.

Beyond the pallet of sounds, the organic concept also informs the arrangement of sounds at points in the composition. For instance, at (0:40-1:10) a cloud of scattered percussive wood sounds is heard. This was considered as analogous to cluster of organic cells; each percussive sound is considered as analogous to a cell, and these are distributed in a cluster within the time domain.

Aside from the organic concept, ASCs produced by Peyote or Psilocybin mushrooms are also characterised by constant shifts in perception; while colours may seem more intense than usual or proportions may seem altered, these effects change temporally. Similarly, focus of attention may shift between different points. An example of this is found in Huxley’s classic text *The Doors of Perception*, in which under the influence of mescaline, his attention becomes deeply absorbed by the creases of his flannel trousers, before shifting on to something else (Huxley, 1994, pp.17-22). In the composition of *Night Breed*, this notion of shifting attention is incorporated by using various techniques involving filters, EQ, reverb, convolution and amplitude envelopes. Using these 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 design of these transitions is deliberately smooth, gradual and organic, in consideration of the organic mimetic approach of the piece.

Overall, *Night Breed* can be considered as a piece that combines approaches for electronic dance music and electroacoustic music. The basic form of the piece is provided by utilising established approaches from dubstep, jungle or techno. However, these forms are adapted through the use of certain techniques such as an organic approach, which is derived from the concept of an organic or ‘cellular’ hallucination.

Surfer Stem

Surfer Stem (7:11) also utilised Leary’s ‘seven levels of energy consciousness’ concept to provide the basic concept for the piece. In this case, the ‘atomic level of energy consciousness’ was used. 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, such as the perception of hallucinations that resemble atoms or electrons. Interestingly, Leary actually refers to electronic music specifically as an art form capable of expressing this concept.

In order to incorporate the notion of an ‘atomic level of energy consciousness’ through the design of the piece, a futuristic, digital aesthetic was sought in contrast to the organic approach used in *Night Breed*. I also drew creative inspiration for the piece from William Gibson’s *Neuromancer* (1995), in which Gibson describes a virtual reality beach scene that extends infinitely. Hence the piece is inspired by the notion of an altered state of consciousness that occurs in virtual reality.

The general approach of the piece is informed by a combination of approaches from electroacoustic music and ‘flashcore’, an experimental form of speedcore techno (techno with very fast tempos) which can be considered as a psychedelic form of cyberpunk music (Weinel, 2007). These approaches, and the use of predominantly synthesized sound enable the futuristic digital aesthetic that was sought for the piece, in accordance with the atomic theme.

This piece also incorporates the notion of ‘sonic atoms’: a term the flashcore producer La Peste uses to describe the approach of using micro percussive sounds in his own music. For *Surfer Stem* I adapted this idea, using rapid streams and clouds of percussive sounds in a similar way in order to reflect clusters and patterns of atoms or electrons, which might be experienced during an atomic hallucination of the type Leary discusses. These sounds can be heard from 2:04-2:22.

Another approach used in *Surfer Stem* is the technique of incorporating vocal sounds, to which a granular time-stretch effect is applied. The source material for these sounds is sampled from surf rock n’ roll music, which was chosen to evoke a virtual reality beach theme inspired by *Neuromancer*. The time-stretching process reflects the notion of distorted time-perception that can occur during a hallucination; the usual duration of the sounds are extended. Additionally, the implementation of this process adds a synthetic sheen to the piece, which suits the digital aesthetic.

Considering the piece as a whole, it is likely to be received primarily as an electroacoustic piece with a futuristic glitch or video game-type aesthetic. However once again, the piece is infused with the psychedelic concept through certain choices regarding the materials and processes used. The piece can be aptly described with the term ‘cyberdelic’; a portmanteau or ‘cyberspace’ and ‘psychedelic’ used by Leary during the 1990s to express his views on the consciousness altering potential of computer technology (Leary, 1994).

Swamp Process

Swamp Process (7:35) is based on an imaginary hallucination of a gloomy swamp or cave environment. The piece draws inspiration in this regard from John Uri Lloyd’s *Etidorhpa*; a hollow earth theory novel, which describes a hallucinatory adventure precipitated by the consumption of an intoxicating substance (Lloyd, 1992). The basic form of the piece uses an electroacoustic approach that also incorporates some approaches from dub music, such as through the subtle use of dancehall rhythms. The way in which some aspects of the piece were designed also involved the dub approach of creating a track, from which various components are removed or stripped back in order to leave only traces of these elements at certain points.

The piece is again adapted by using Leary's concept of cellular level consciousness, and so uses similar organic approaches to sound similar to those used in *Night Breed*. In particular, clouds of organic percussive sounds are used. These clouds, first heard at 0:28-0:35 were conceptualised as a hallucinatory 'creature' constructed from a cloud or swarm of particles. This concept drew inspiration from Lewis-Williams discussion of stone-age cave paintings of animals, which are comprised of dots (Lewis-Williams, 2004, pp.126-130). According to Lewis-Williams the dot patterns that make up the animals reflect the dot patterns seen during hallucinatory experiences; so the cave paintings can be viewed as representing hallucinations of animals comprised of clusters of dots. The clouds of percussive grains used in *Swamp Process* are analogous to these; each percussive grain is equivalent to a dot, and the collective whole comprises a hallucinatory 'creature'. These 'creatures' move around the spatial field during the piece, and are a key feature. At the climax of the piece (6:39-7:05), these creatures engulf the spatial field.

Other materials are also considered with regards to features of an ASC experience. In the piece, bass motifs as heard at 1:12-1:44 are associated with the physical sensations of uneasiness that may be experienced during a hallucination, since bass can be more readily felt physically within the body during performances of the piece at sufficient volumes. Droning sounds can also be heard from 1:25-1:46. These correspond with the notion of distorted time-perception as discussed previously.

As with previous works, the form of the piece is adapted by using ASCs to indicate the design of certain aspects of the composition. However, the main evolution in the approach used in this piece versus earlier works such as *Night Breed*, is that here I was beginning to use a more focused narrative approach to structure the work. While *Night Breed* followed a structure that was mostly derived from electronic dance music, with *Swamp Process* I was beginning to structure aspects of the piece around the idea of events that might occur during a hallucination. For *Swamp Process*, there is a narrative structure in which hallucinatory 'creatures' move around an imaginary swamp. Thus, hallucinatory narratives begin to inform the structural arrangement of sonic materials in time.

Entoptic Phenomena

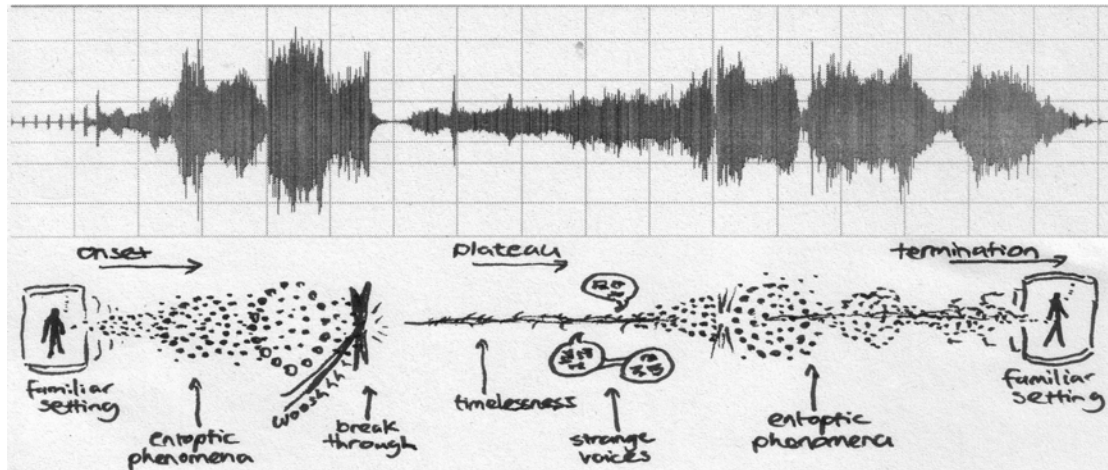
Entoptic Phenomena (5:44) was the first piece produced that fully demonstrates the approach of using a narrative based around an ASC experience, in order to inform the structural design of the piece. The composition follows a hallucinatory narrative based on a hypothetical DMT hallucination that occurs in an isolation tank. In this regard it draws inspiration from the movie *Altered States* (Gottfried & Russell, 1980), which is loosely based on the real-life work of John Lilly, who carried out extensive research regarding the hallucinatory effects of sensory isolation tanks, often in combination with psychedelic drugs (Lilly, 1972). The conceptual model of the DMT experience is also informed by Strassman's clinical trials of the 1990s with the drug, and the resulting accounts of his participants.

The narrative concept for the piece is that an individual in an isolation tank, wearing a snorkel, begins to hallucinate. As the experience onsets, hallucinatory visual patterns are perceived (entoptic phenomena). These gradually intensify, before a 'break-through' or transition occurs. Following this, the individual experiences a sense of

timelessness, during the most intense phase or 'plateau' of the experience. During this phase, the individual hears the voices of strange entities. After a period of time, this experience gives way to a further wave of visual patterns of hallucination, which gradually subside as the experience reaches termination. At the end of the piece, the individual is returned to the isolation tank. The DMT experience usually has a quick onset and duration of only a few minutes, so the whole thing takes place over 5-6 minutes.

This narrative concept is implemented in the design of the piece through the arrangement of sonic materials that relate to specific features or events of the experience. Firstly, at the beginning of the piece, snorkel sounds reflect the real-world experience of the sounds of the isolation tank. Following this, rapid streams of percussive sounds that rotate in the stereo field reflect visual patterns of hallucination (0:57-1:55). Developing the use of a similar concept in other pieces, percussive sounds are seen as analogous to dots. By rotating rapid streams of these in the spatial field, the effect is seen as analogous to funnel patterns of dots pieced during hallucinations, as discussed by Heinrich Klüver as 'form constants'. This rotating effect is accomplished using a Doppler effect, and is heard prominently at 1:30-1:37. During the section 1:45-1:55 a crescendo ending in silence can be heard. This reflects the phenomena of 'breaking through' that Strassman's participants describe, during which a transition occurs from geometric patterning effects to a deeper form of hallucination. During the plateau phase from 2:04 onwards, droning sounds are used to reflect distortions to time perception. Additionally in this section the voices of strange entities are created by applying various effects processes to vocal material. In the final phase of the composition, rapid streams of percussive sound are used once again to describe visual patterns of hallucination (3:35-5:20), before the snorkel sound returns as the piece closes.

The arrangement of these sonic materials follows the narrative concept of the DMT hallucination described. Hence, the piece as a whole progresses in time in a way that is equivalent to a DMT hallucination, as indicated by the graphic score in Figure 2. The composition is 'framed' by real-world sounds that occur at the beginning and end of the composition; a technique that is similarly used by Barry Truax in compositions such as *The Shaman Ascending* (2009) and *Chalice Well* (2009). The three main musical sections then mirror the onset (beginning), plateau (middle) and termination (ending) of a DMT experience, containing musical materials that correspond with features of hallucination.



[FIGURE 2]

Figure 2. Graphic score indicating the structure of *Entoptic Phenomena*

Structural Approach

The four compositions discussed each utilise approaches to electroacoustic composition that broadly function by adapting certain aspects of compositional design in correspondence with ASCs. It should be apparent that each piece draws upon a slightly different view or concept of ASCs in order to form these correspondences. Furthermore, while earlier works such as *Night Breed* incorporate the concept of ASCs in ways the listener may find relatively subtle, in later works such as *Entoptic Phenomena* the concept permeates the design of the piece in more significant ways. In particular, while *Night Breed* incorporates the ASC concept through aspects such as the design of certain sonic materials, *Entoptic Phenomena* establishes an approach where the actual structure of the composition is based on the equivalent progression of an ASC in time.

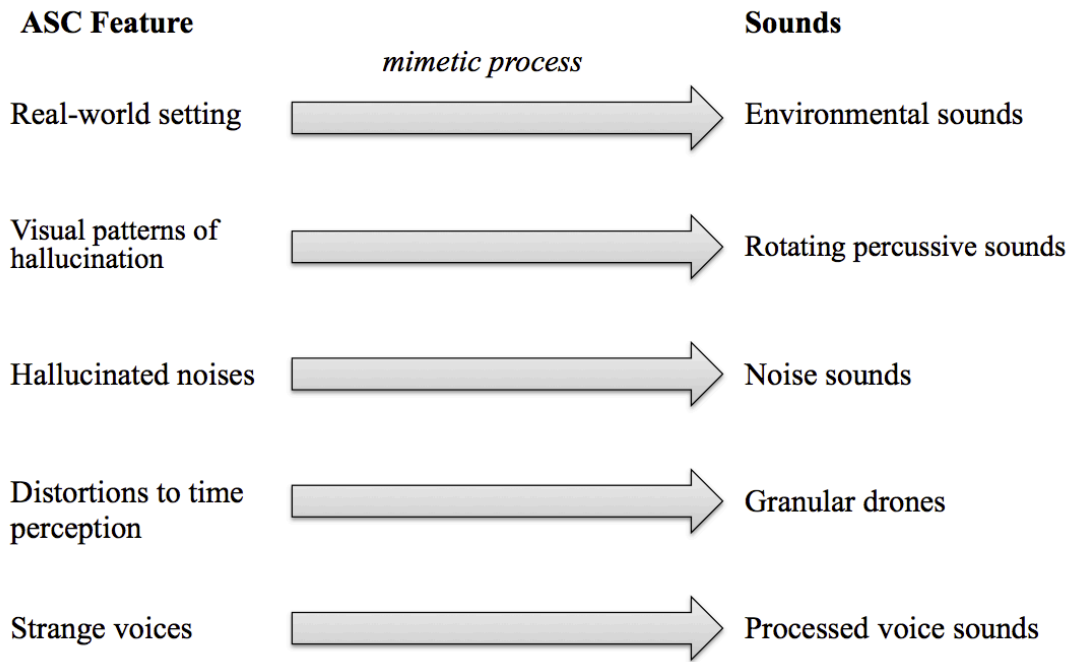
While either approach may yield successful musical results, the latter approach could be viewed as indicating the more cohesive general approach to using ASCs as a basis for composing electroacoustic music; therefore, I shall now explore this approach in further detail. As discussed with regards to *Entoptic Phenomena*, the approach relies on the design of sonic materials that correspond with features of hallucination, and the arrangement of these into a corresponding structure. Each of these principles will now be reviewed, as this will establish the general ‘structural approach’, but also enable us to consider possible variations. These variations in turn suggest different categories of psychedelic electroacoustic composition.

Sonic Materials

The general method that is used in these compositions is to take typical ‘ASC Features’: features that are commonly described during experiences of hallucination, and use these as a basis for the mimetic design of sonic materials. These ASC features may include various characteristics which are described in the literature regarding ASCs, such as distortions to the perception of external sounds; hallucinated noises; hallucinated voices; visual patterns of hallucination; and distortions to time

perception. For each of these ASC Features, corresponding sounds are produced, using appropriate sound design techniques.

For example, let us take the feature of ‘distorted time perception’ as an example. This is a common feature of hallucination, during which a single moment may seem to last much longer than usual, or vice versa. A suitable corresponding approach for designing mimetic sonic material is to take sonic material from the composition and time-stretch it. The resulting material may then be considered to reflect this ASC feature. Figure 3 illustrates this process for this and several other ASC features.



[FIGURE 3]

Figure 3. Mimetic processes for obtaining sonic material.

Table 1 also lists several key features that may occur during a typical experience of hallucination. For each of these features, we may consider the corresponding sonic material that may be produced. Considering Hobson’s Input axis, we may also categorise the sonic material as either ‘internal’: relating to internal sensory experience which is entirely the product of hallucination, or ‘external’: relating to acoustic phenomena which originates in the external environment. Lastly, we may additionally consider whether the sounds ‘literally’ reflect an aural sensory experience, or whether they relate to the feature of hallucination in a more ‘metaphorical’ way. These concepts can be most easily clarified through worked examples.

Beginning with the basics: ‘real-world setting’ describes the sounds that someone would normally hear when situated in a given environmental context – regardless of whether or not they were in an ASC. Imagine you are in a forest for example. The ‘real-world setting’ sounds are those that you hear around you: birds, perhaps some noise from a nearby road and the rustling of leaves. These sounds can be designed by using familiar techniques for eliciting an environmental location, such as by using

sounds recorded with a microphone that present the location in question. Appropriate techniques to create a realistic spatial impression can be used. These sounds are classed as 'external' since they relate to sounds that would have a real acoustic source within the scene. They are classed as 'literal' because they directly relate to the sounds that one would hear aurally in that situation.

'Real-world distorted' then describes the situation during which these real-world environmental sounds are subjectively experienced as qualitatively different due to an ASC. In our forest scene, experienced in a hallucination, sounds such as birdcalls or the rustling of leaves may be experienced as though altered in some way due to the hallucination. For example, during auditory hallucinations an individual may describe the experience of sounds seeming to echo in a manner that is not consistent with the physical acoustic properties of the environment; sounds may appear more close or distant than one would expect, or may appear to emit from a different spatial location to than would be expected. These sounds are also primarily 'external', since they are sounds that have a real acoustic origin, though the subjective perception of these is altered. These sounds can be created by modifying the environmental sounds of the previous category. They can be classed as 'literal', since they relate directly to an aural experience.

'Hallucinated noises' are often described in auditory hallucinations, and may consist of various popping sounds, tones or other sounds. In our woodland scene, the individual begins to hallucinate and hear some strange popping sounds that do not have any origin in the external environment. These can be designed using electroacoustic techniques; either using synthesized sound or recorded sounds as source material, which can then be processed as necessary to achieve the specific sound being sought. These sounds can be categorised as 'internal', since they would be heard due to auditory hallucination, and would have no acoustic origin. They can be classed as 'literal', since even though the sounds do not originate in the external environment, they remain an aural experience.

'Strange voices' are likewise a form of internal sound caused by auditory hallucination. In Strassman's DMT studies for example, participants would often encounter strange beings or entities, with which they may have verbal communication. In our woodland scene as the hallucination becomes more intense, perhaps some form of pixie appears and communicates with the individual. Strassman's studies often describe hallucinated entities as communicating through some form of alien language, so suitable creative approaches may be employed to design sounds that reflect this, such as by manipulating voice material using granular techniques, vocoders or other processes. The sounds can be classed as 'internal' since the experience is a hallucination, and remain 'literal' as they describe an equivalent aural experience.

'Visual patterns of hallucination' as discussed previously are a visual feature typical of hallucinations, and may consist of various geometric patterns such as spirals of dots. In our forest scene the individual begins to see spiral and funnel dot patterns, as are typical of a hallucination. The compositional approach that I use to reflect these patterns in sound is to use streams of percussive sound that are rotated spatially. This approach interprets dots as percussive hits, and moves them in circular and spiral patterns to reflect the feature. These sounds relate to a visual sensory experience, which is 'internal' since the patterns are produced within the visual system have no

external stimulus. However, the sonic materials can be classed as ‘metaphorical’ since the experience they are based upon is visual not aural; visual elements are interpreted as corresponding sounds (the only exception to this is if the sounds are considered in terms of ‘synesthesia’: a separate matter that I will discuss shortly).

The ‘distortions to time perception’ feature as discussed previously describes the subjective experience of time seeming to pass more quickly or slowly than usual. In the woodland scene, our individual suddenly feels as though time has slowed down. In my compositions I have sought to reflect this effect by using granular drones and time-stretching processes. This feature is perhaps best considered as neither a symptom of the visual or aural senses but as a property related to memory and attention which gives rise to a sense of time passing at different rates. For this reason, it has not been classified as either ‘internal’ or ‘external’, although we might consider this feature to effect the experience of external sounds. For example, real environmental sounds might be experienced as if slowed down; if aural perception is affected in this way, the feature could be classed as ‘literal’. However, the use of sounds such as drones to convey the idea of timelessness in cases where those drones are not really what we imagine the person would actually hear in the experience, could alternatively be considered as ‘metaphorical’.

‘Euphoric sensations’ describes those feelings of ecstasy that are often described in some ASCs; continuing the woodland example, our individual is filled with a warm glowing sensation. The sounds that might best correspond to this sensation are perhaps some form of harmonic material, which is ‘light’ in terms of having a high spectral centroid. This feature does not relate to the visual or aural sensory input; the musical material is interpretive of the euphoric sensation, it is not equivalent to sounds that would really be heard in the situation. The corresponding sounds can therefore also be considered ‘metaphorical’.

‘Anxiety’: the opposite of euphoria, is self-explanatory; in the woodland example things are taking a turn for the sinister! Using ‘dark’ musical material with a lower spectral centroid could reflect the mood. These materials do not directly relate to the Input axis and can be considered ‘metaphorical’, as they are not sounds that would really be aurally experienced.

The caveat regarding the discussion of ‘metaphorical’ sounds is that the analysis becomes slightly more complex if we take the ASC feature of ‘synesthesia’ into account. In experiences of synesthesia, the senses become blurred; sounds may have a colour; tastes may have a smell. If we include synesthesia as part of the compositional process then it is possible to conceive of hallucinated sounds that are experienced aurally, which correspond with non-aural aspects of the hallucination. Hence a geometric visual pattern effect might actually be accompanied by the subjective aural experience of sounds that correspond with that pattern. Indeed, reports regarding experiences of hallucination do describe these types of synesthetic experiences. However, it is worthwhile to note that more commonly individuals describe visual hallucinations (internal) that seem to be triggered by sounds in the environment (external), rather than the other way around. It is for this reason that although the sounds classed as ‘metaphorical’ could be taken as ‘literal’ if they are related to synesthesia, the table has classed them as ‘metaphorical’ as this is may not necessarily be the case.

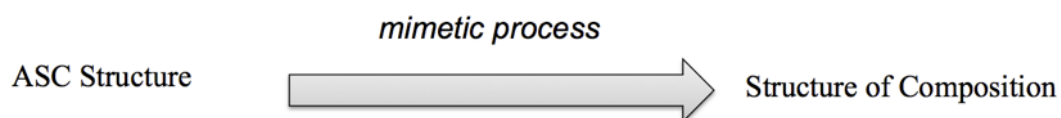
ASC Feature	Sounds	Input Axis	Type
Real-world setting	Environmental sounds	External	Literal
Real-world distorted	Modified environmental sounds	External	Literal
Hallucinated noise	Noise sounds	Internal	Literal
Strange voices	Processed voice sounds	Internal	Literal
Visual patterns of hallucination	Rotating percussive sounds	Internal	Metaphorical
Distortions to time perception	Granular drones	-	Literal or Metaphorical
Euphoric sensations	'Light' harmonic materials.	-	Metaphorical
Anxiety	'Dark' bass materials.	-	Metaphorical

Table 1. Types of sounds based on features of hallucination and their classification.

The sounds detailed in the table are not an exhaustive list of all sound materials that may be designed in correspondence with features of hallucination, but rather some key examples. These illustrate some typical features of hallucination, the types of corresponding sounds that could be produced and how these can be classified. While others utilising this compositional process may wish to draw upon other features, or utilise slightly different processes for designing metaphorical materials, the basic premise of designing sonic materials based on these features of hallucination should be clear.

Structure

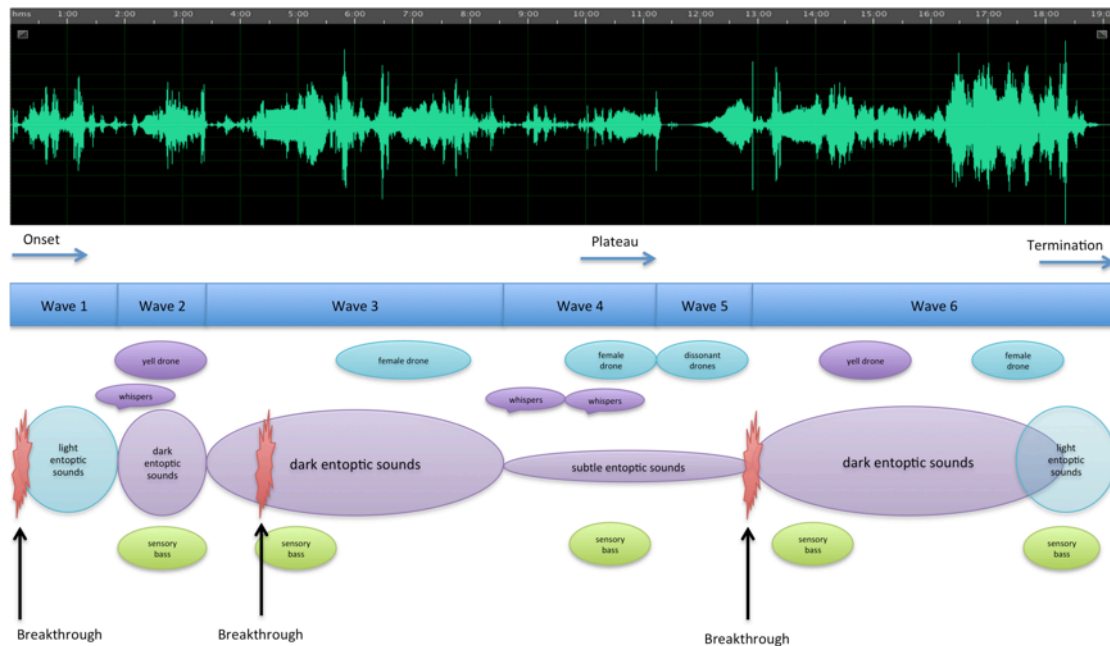
Once sonic materials have been designed in correspondence with features of hallucination, these can be arranged into a structure that is based on the progression of a hallucination in time. Figure 4 indicates the basic procedure. My compositions usually use some form of {onset, plateau, termination} structural model of ASCs, which then indicates the design of the composition. Sonic materials are then situated within the composition with respect to where they would occur within a hallucinatory narrative that follows this structure.



[FIGURE 4]

Figure 4. Mimetic process for creating musical structure.

Figure 5 is a diagram showing an example structure from a later composition: *Nausea* (19:11) that utilises this approach¹. For this piece the composition is divided into ‘waves’, which are musical movements that are conceptually considered as different phases of the hallucination. Hence a {wave 1, wave 2, wave 3, wave 4, wave 5, wave 6} structure is used, within which waves 1-2 are the onset, waves 3-5 are the plateau, and wave 6 is the termination.



[FIGURE 5]

Figure 5. Example ASC structure as used within *Nausea*.

The sonic materials used within *Nausea* correspond with features of hallucination, and ‘breakthrough’ moments relate to significant transitions that occur within the experience. At this point it is useful to note that no ‘real-world setting’ sounds are used to frame the composition in the way that they are used in *Entoptic Phenomena*. Therefore, all the sounds are based on either those that would literally be heard within a hallucination, or are metaphorical of sensations or moods that may occur due to hallucination. The decision not to use the sounds of a hypothetical real-world setting is a deliberate one, as it indicates a slightly different variation on the compositional approach utilised. Moreover, the choices available regarding the use of external, internal, literal and metaphorical sonic materials indicate four distinct compositional approaches within the general structural approach to ASC composition described; these shall now be discussed.

Categories of ASC Composition

The categories of ‘ASC Composition’ that we may consider all utilise the structural approach described in the previous section, where sonic materials are designed in

¹ For an extended discussion of *Nausea*, please see Weinel, 2013.

relation to features of hallucination, and these are then arranged into corresponding musical structures based on ASC. However as discussed, different types of sonic materials can be used which relate to external or internal experience, and may be 'literal' or 'metaphorical'. Therefore different approaches to composition can be used depending on whether or not sounds from an external environment are used, and whether the sounds associated with hallucination are restricted to those that relate literally to auditory hallucination, or whether sounds that metaphorically reflect other aspects of the hallucination are also included.

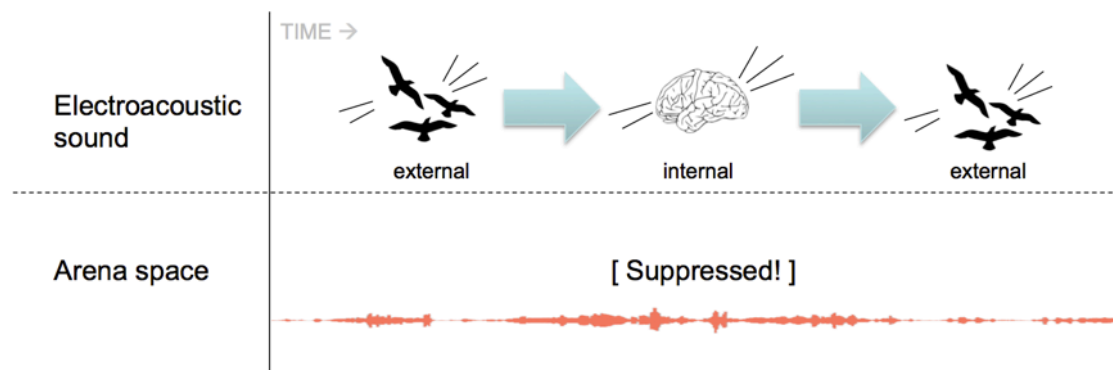
Considering first whether or not sounds from an external environment are used, this creates alternative listening paradigms. I refer to the paradigm of using external sounds to contextualise the composition as 'transported', since these pieces use sound to create the illusion of a hallucination that occurs within some environment other than the concert hall. For instance as Gary Kendall discusses, electroacoustic compositions such as Denis Smalley's *Empty Vessels* effectively utilise spatial techniques in order to situation the listener in unusual places such as garden pots (Kendall, 2010, pp.231-233). In such cases, the listener perspective can be considered as being 'transported' to one or more situations. For electroacoustic compositions of this type, sound creates a kind of illusion for the listener to experience. For this listening paradigm, it is usually desirable to support the illusion by suppressing any sound that is not part of the recording as much as possible. In an electroacoustic concert this means the audience has to be quiet, and the room needs to have sound proofing to prevent additional noise. Most electroacoustic concerts seek to suppress sound that is not part of the composition in this way, because otherwise it interrupts the spatial illusions of the composition.

An alternative to this 'transported' mode of composition is to place the electroacoustic composition as an additional layer of sound, in acceptance of any sound that exists in the performance arena. In this case, sound is not used to create the illusion of situating the listener elsewhere; the real world environment in which the music is heard is acknowledged. I refer to this as a 'situation' approach. In such cases it might be desirable for the arena space (a concert hall for example) to suppress other types of noise, however it is equally possible that the electroacoustic piece compliments those sounds that are already there. This 'situation' approach is often used in site-specific sound artworks, such as those that were dotted around Athens for the *International Computer Music Conference 2014*. Similarly, this approach may also be used in other sound artworks or concerts that situate speakers in outdoor locations, where the environmental sounds of the location are acceptable and may be viewed as complimenting the composition.

The importance of these 'transported' versus 'situation' approaches emerges for ASC compositions because the ambient sounds of the arena space are a form of external input. For 'transported' ASC compositions, some sounds in the composition will be intended to replace the external experience provided by the arena space. However, a 'situation' ASC composition can acknowledge the arena space sounds. In the latter case, it is as though the composition adds a fabricated layer of internal experience on top of the external experience provided by the arena space. The 'situation' composition then can be almost like a form of augmented reality or simulation of hallucination.

In addition to the transported / situation dialectic, we may also consider the different approaches offered by using sonic materials that literally relate to subjective aural experience, versus those that relate experiences of hallucination via metaphorical approaches. These define how the actual contents of hallucination are articulated through sound and music. In the following diagrams, ‘authentic’ describes approaches that follow the literal approach, while ‘interpretive’ uses the metaphorical approach. These terms are used because the ‘authentic’ approach is likely to yield a more realistic approach, whereas the ‘interpretive’ method depends more significantly on subjective interpretation and might yield a more ‘musical’ or impressionistic result.

Transported / Authentic

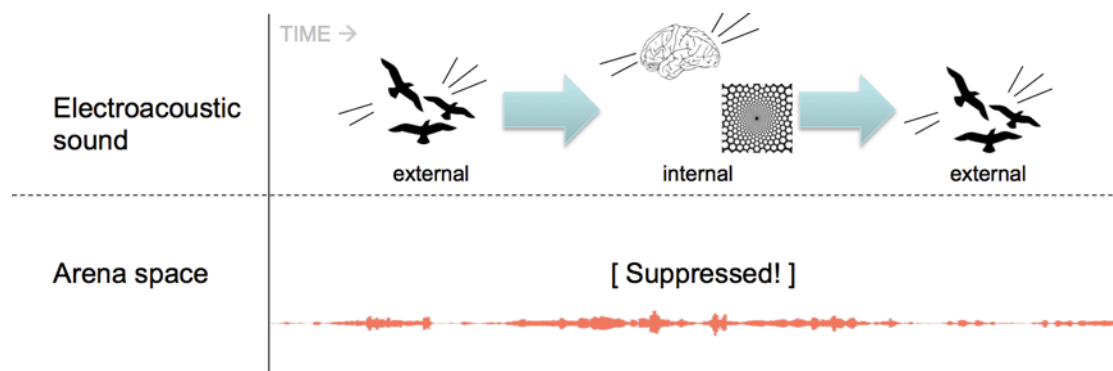


[FIGURE 6]

Figure 6. Transported/Authentic mode of composition.

The composition establishes an environmental context other than the arena space. Sounds are created which relate to those that would be subjectively experienced as sound during a hallucination (auditory hallucinations). Any noise from the arena space that is not part of the composition is considered antithetical to the listener experience and is suppressed as far as possible. Stuart Cunningham’s miniature *LSD No. 1* follows this approach (Cunningham, 2014).

Transported / Interpretive

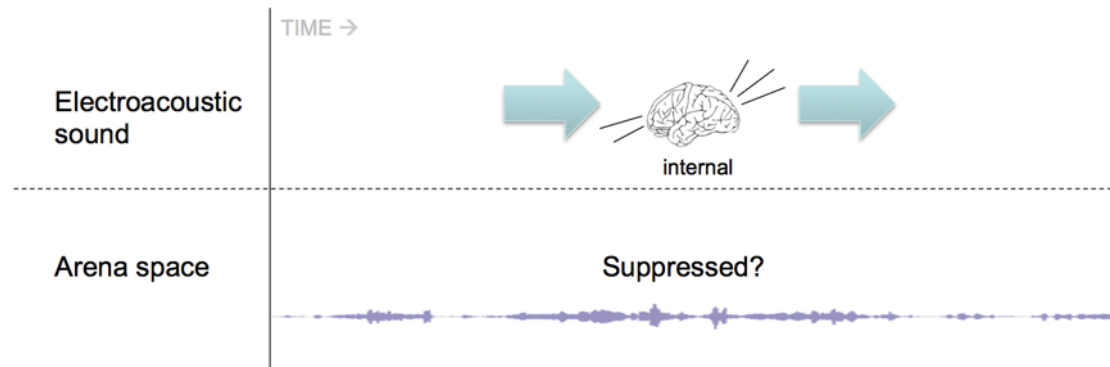


[FIGURE 7]

Figure 7. Transported/Interpretive mode of composition.

A transported environmental context is established, however the sounds that describe the hallucination do so using a combination of both ‘literal’ and ‘metaphorical’ approaches; some sounds are those that would be heard during a hallucination, while others interpret visual or other aspects of the experience. Noise from the arena space is suppressed. *Entoptic Phenomena* uses this approach.

Situation / Authentic

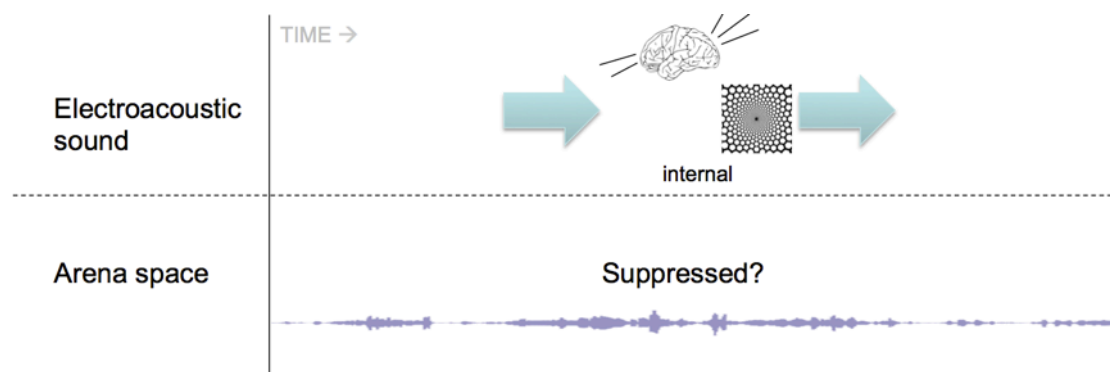


[FIGURE 8]

Figure 8. Situation/Authentic mode of composition.

In the Situation/Authentic approach, the composition forms an additional layer that is added to the real-world location. Therefore, the arena space sounds may not need to be suppressed. The sounds produced in this mode of composition are authentic; they describe only those sounds that would really be heard during a hallucination. In this sense, the approach could be considered as a form of augmented reality, as it effectively adds the experience of auditory hallucination as an additional layer that combines with the ambient sound of the performance environment. I have not yet produced a piece that uses this approach.

Situation / Interpretive



[FIGURE 9]

Figure 9. Situation/Interpretive mode of composition.

The final mode of composition: ‘Situation/Interpretive’ similarly acknowledges the situation, or ‘external’ sensory input in terms of Hobson, and synthetically creates

material that relates to the ‘internal’ channel. However, this material may consist of both literal sounds and metaphorical or synesthetic sounds. This mode of composition was used for my piece *Nausea*.

Conclusion

Through the course of this article, I have detailed a compositional process for electroacoustic music that utilises altered states of consciousness as a basis for designing corresponding materials and structures. This approach was developed through the praxis of composing the pieces contained on the *Entoptic Phenomena in Audio* vinyl. These pieces can broadly be considered as utilising an adaptive approach, whereby standard compositional methods are modified by selectively incorporating elements that are based on the psychedelic concept. The piece *Entoptic Phenomena* is particularly notable in that it is the first to properly establish a cohesive structural approach, where the structure of the piece follows the progression of an ASC over time. This piece then indicates a general approach with at least four possible variations, which have been described here. Since composing *Entoptic Phenomena*, other pieces such as *Nausea* and my colleague Stuart Cunningham’s *LSD No.1* have continued to explore this compositional area. Though beyond the scope of this article, some of the principles discussed are also applicable to audio-visual media, and I have also produced work that explores this.

The pieces on the *Entoptic Phenomena in Audio* vinyl were originally presented as fixed media digital works and as real-time versions, but have more recently been presented on vinyl. Vinyl was chosen due to the pleasure I personally take from this format, and in order to create a cultural artefact that integrated my artwork based on on Klüver’s form constants on the label artwork. The medium has also allowed me to situate the record slightly beyond the usual sphere of electroacoustic music, by placing in within the domain of electronic dance music and psychedelic rock. In such forums, pieces such as *Night Breed* have been interpreted with such as genre descriptors as ‘ambient dubstep / ambient speedbreaks’, while also being simultaneously ‘full of psychedelic elements’ (Toolbox Records, 2014). This is aptly summarises the effect that I would hope for with the adaptive approach. However I also feel that the ‘structural approach’ that I have outlined here may eventually yield something that approaches realistic representations of ASCs. Eventually it should be possible to accurately create ‘altered states of consciousness simulations’, which accurately represent the visual and auditory components of hallucination using computer music and art.

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