SONIC PHANTOMS

Compositional explorations of perceptual phantom patterns

BARBARA ELLISON

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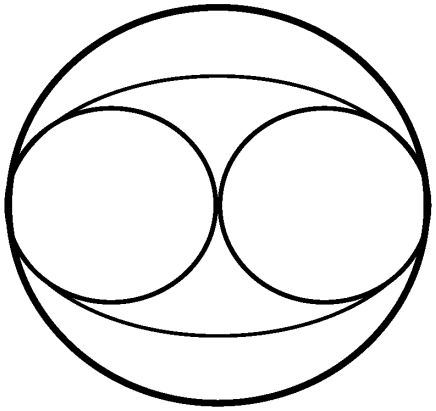

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Note on Accompanying Documentation

Given the creative practice-based nature of this Ph.D., besides the text and images in this volume, this Ph.D. dissertation also comprises, as an integral component of it, the following documentation:

(1) Printed scores of some of the compositions presented (those that can be scored).

(2) Audio recordings in digital format of all the compositions presented.

(3) Audio-visual illustrative examples of music and sound by different composers, performers, musicians, artists and researchers (audio and video files). These audio-visual examples are the equivalent, with sound and images, of the usual text endnotes; they are indicated accordingly in the text as consecutively numbered superscripts with the preceding indication 'AV'.

In addition to illustrating processes, concepts and ideas, all this accompanying documentation serves also the crucial function of exposing / presenting the 'Sonic Phantoms' illusions that are the central theme of this Ph.D. Precisely because they are perceptive illusions, I believe these can only be suitably described by means of their actual hearing / listening, as opposed to any attempts at describing them by means of insufficient or inapt metaphors and / or technical analyses. I have therefore intentionally avoided such textual descriptions of the illusions themselves, and dedicated instead all the written text to the necessary description, explanation and contextualisation of the processes, techniques and strategies that make it possible to perceive and induce the 'Sonic Phantoms'.

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Abstract

I use the term ‘Sonic Phantoms’ to refer as a whole to a cohesive collection of sound compositions that I have developed over the past five years (2009-2014; fifty pieces, structured in four separate collections / series), dealing at a fundamental level with perceptual auditory illusions. For the creation of this compositional body of work, I have developed a syncretic approach that encompasses and coalesces all kinds of sources, materials, techniques and compositional tools: voices (real and synthetic), field recordings (involving wilderness expeditions worldwide), instrument manipulation (including novel ways of ‘preparation’), object amplification, improvisation and recording studio techniques. This manifests a sonic-based and perceptive-based understanding of the compositional work, as an implicitly proposed paradigm for any equivalent work in terms of its trans-technological, phenomena-based nature.

By means of the collection of pieces created and the research and contextualisation presented, my work with ‘Sonic Phantoms’ aims at bringing into focus, shaping and defining a specific and dedicated compositional realm that considers auditory illusions as essential components of the work and not simply mere side effects. I play with sonic materials that are either naturally ambiguous or have been composed to attain this quality, in order to exploit the potential for apophenia to manifest, bringing with it the ‘phantasmatic’ presence.

Both my compositions and research work integrate and synergise a considerable number of disparate musical traditions (Western and non-Western), techno-historical moments (from ancient / archaic to electronic / computer-age techniques), cultural frameworks (from ‘serious’ to ‘popular’), and fields of interest / expertise (from the psychological to the musical), into a personal and cohesive compositional whole. All these diverse elements are not simply mentioned or referenced, but have rather defined, structured and formed the resulting compositional work.

Key words and terms:

Sonic Phantoms, Phantasmagenics, Sonic Blotscapes, Acoustic Illusions, Creative Apophenia, Auditory Streaming, Interlocking, Repetition, Broadband Noise, Semantisation, Natural Polyphony.

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1 PHANTASMAGENICS

1.1 SONIC PHANTOMS AS EMERGENT PRESENCE

I use the term 'Sonic Phantoms' to refer as a whole to a cohesive collection of sound compositions that I have developed over the past five years (2009-2014), spanning a wide array of creative tools and means - musical instruments, voice, objects and natural sounds - and dealing at a fundamental level with perceptual auditory illusions.

More generally, in terms of its potential application to compositional work other than mine, and more specifically, in terms of the identification of the phenomenon, I introduce this term to describe a particular category of auditory illusions. Sonic phantoms not only 'trick' the ear by producing deceiving impressions of spatial or temporal experience, as other acoustic illusions do; they are hearing illusions that specifically give rise to the generation of illusory entities or patterns that have the character of presences with apparent semantic or meaningful features. In other words, they manifest as a 'phantasmatic' emergent phenomenon.

Sonic phantoms take place as something apparently heard but having no physical reality in terms of acoustic waves as perceptive input. They are auditory illusions that we can indeed perceive but their locus of existence as hearing phenomena is only in our mind (our brain). This occurs in these particular cases as a divergence between the acoustic properties of sounds and our subjective, 'phantom-like' perception of them. When we experience these illusions we are hearing emergent fictional sounds, which arise as a subjectively experienced result of a very particular organisation of the real acoustic elements present.

To be sure, these sonic phantoms are not exclusively the result of a specialised compositional or acoustically trained ear. Similarly, they are naturally one type among other possible, non-sonic, varieties of perceptual phantoms. With different degrees of intensity and persistence, we all experience perceptual phantoms everywhere in the world around us. As I will show in more detail below, they are a natural (biological-cognitive) and universal (not culturally specific) phenomenon.

In our everyday lives however, for obvious survival reasons, our objective is precisely to avoid a constant presence of such phantoms or illusions; in general, we are remarkably successful at doing so. In sharp contrast to everyday life, within different creative realms – e.g., in art, in film, in music -

we often set out to deliberately create various illusions of this nature, to 'trick' or fool the brain into seeing or hearing things that are actually not real and present.

As I will illustrate with a wide variety of examples in this PhD dissertation, many cultures worldwide have created music throughout the ages using very different techniques that exploit our pattern-seeking tendencies in order to generate striking sonic phantoms. I have been inspired by this essential and widespread human interest for the generation of auditory and musical illusions. These kinds of phenomena, as well as their creative exploitation, have indeed been recognised and researched independently in different fields of study and musical practice. Ethnomusicologists have described these sonic phantoms as 'inherent or subjective patterns' of hearing (Kubik 1962). Cognitive psychologists and psychoacousticians refer to them as 'auditory streams' (Bregman 1990). And within the realm of composition, terms like 'emergent patterns', 'resultant rhythms', or 'pseudo-polyphony' are common to refer to different varieties of them (e.g. Jones 1961; Reich & Hillier 2002; Pandey 2005). [See the glossary for a description of the quoted terms above].

In my own music, sonic phantom patterns are generated as composed perceptual by-products of specific working processes, such as in my amplified drawing works (described in detail in chapter 4), in which, over time, ritual repetitive circular motions give rise to all kinds of apparently verbal sonic phantoms. I became chiefly interested in the conscious and intentional creation of such phenomena, as well as drawing inspiration from the realm of phantom-producing music-making all around the world. My music explores and exploits this phenomenon in depth, and tries to take it to a level where it becomes the very point and focus of the compositional process.

1.2 PRESENCE BY APOPHENIA

The neurological phenomenon of misfiring or misinterpreting patterns, that is to say, making connections and attributing abnormal significance to them from meaningless random data or formless assemblages of sensory inputs, was given the name of *Apophenia* by the German neurologist Klaus Conrad[1]. In my view, this is likely one of the prime mechanisms for the generation of the kind of phantasmatic presence that I was referring to above. Apophenia comes from the Greek *Apo*, which means 'away from', and *Phenia/Phren*, refers to the mind or cognitive faculties. Examples of it abound (Cross 2010): we see faces and meaningful forms in clouds, rocks or foodstuffs; and in such cases we cannot help the unconscious impulse to endow those meaningless random forms with significant meaning.

Figure 1 | Upper left: Mother Therese in a cinnamon bun. Upper right: Jesus Christ and the Virgin Mary on pieces of toast. Bottom: Jesus Christ in a family photographic portrait. [A web search will typically produce an overwhelming –and, more often than not, amusing– collection of 'discovered' and 'seen' faces of religious icons or celebrities of popular culture]. |

Perception, once considered a somewhat passive process (Good 2006; Macknik et al. 2011), is now understood to be one of active interpretation. In order to successfully interpret our environment, as cognitive creatures we actively search for patterns that are 'meaningful' to us in terms of structure and information. Some say we are 'hardwired' (Guthrie 1995; Shermer 1996; Lewis-Williams 2002;

Bor 2013) to ascertain patterns and are naturally and intuitively prone to seek for them, being masters at their detection. The brain at every moment is actively processing sensory input as we try to make meaningful sense of what is going on around us. We 'see as...' or 'hear as...' because the world around us is –as philosopher William James famously put it– a jumble of 'blooming, buzzing confusion' (James 1950, p.488). For many, we experience the world around us 'through a glass, darkly', as in the blurry reflections of brass mirrors of antiquity[2].

We are often confronted by a number of possible and plausible interpretations for our sensations. The more ambiguous the scene, the more actively we search to find patterns, the more possible patterns there are to detect. This manifests in a particularly clear way with what are known as 'multistable illusions', most commonly known from visual bistable illusions or images that provide a constantly alternating impression between two plausible interpretations. Multistable illusions play with our normal everyday sense of perception in that they can have multiple interpretations on the perceptual level and each can be a valid interpretation. They reveal how easily our own brains can fool us and remind us that we cannot always rely on our senses for an objective and accurate representation of the world.

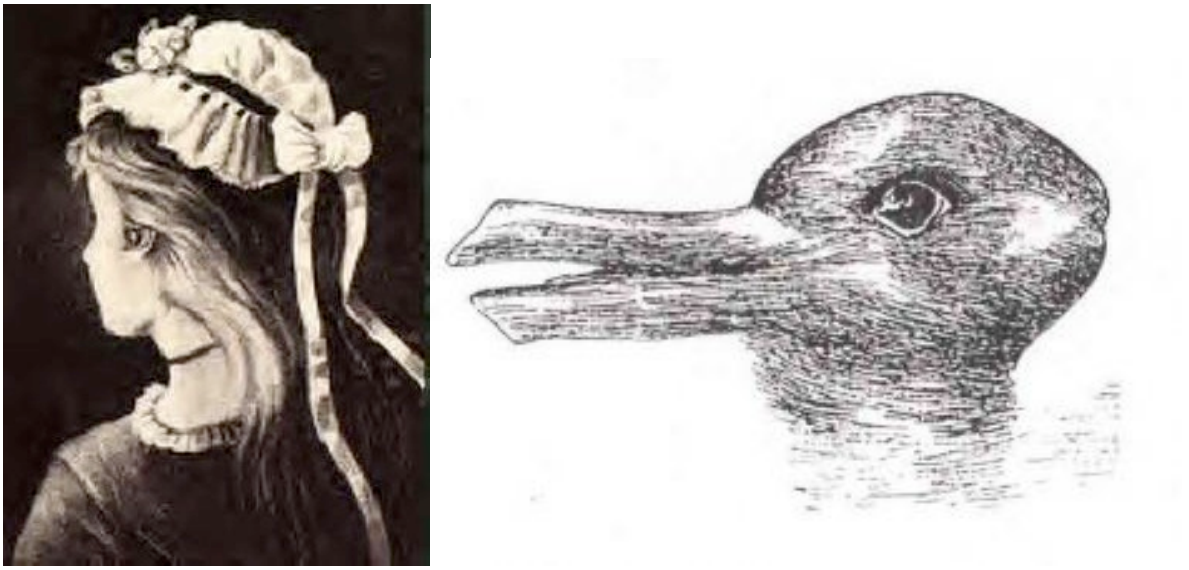


Figure 2 | Classic examples of bistable visual illusions. |

Cognition is thus to a large extent pattern recognition, and what this ultimately means is that the brain is predisposed towards seeing 'something' rather than 'nothing' (Guthrie 1995). Even in the case where there is nothing, we will endeavor to find something (Guthrie 1995; Shermer 2012; Bor 2013). Our brains function as pattern-detection machines, connecting dots to find meaningful

relationships within the constant bombardment of multiple sensory inputs that we have to deal with. Naturally, without this remarkable ability -this 'patternicity' (Shermer 2012)- the world around us would be utterly chaotic, overwhelming and meaningless.

Different anthropologists and researchers on the origins of religion and art see our pattern-seeking propensity –a remarkably magnified ability considered to be intrinsic to perception in humans– as a preeminent natural basis of anthropomorphism, animism, religious beliefs, superstition and magical thinking (Lewis-Williams 2002; Guthrie 1995). For the skeptic, apophenia would be *the* root of all things paranormal or supernatural, from UFOs to prophecies.

From a purely biological point of view, this would be a 'better-safe-than-sorry' strategy: in terms of survival, it is safer for us to wrongly attribute organisation, structure or 'liveness' to inanimate things than not to detect a life-threatening predator. As Guthrie (1995) put it: better to mistake a boulder for a bear than a bear for a boulder.

Figure 3 | Apophenia: seeing faces and meaningful forms in rocks. |

1.3 APOPHENIA AND CREATIVITY

Logically and perhaps inevitably, this outstanding capacity, natural and profoundly human, can also be a paramount source of creativity. As we generate beliefs and superstitions, so we can develop works of art, literature or music that stem from apophenia:

> A mild case of apophenia is a novelist's secret weapon that brings readers and literary success. We spend our working days seeing spontaneous connections between unconnected events, people, and lives, and weaving meaning into those connections. (Moore 2012)

Throughout my work over the past few years, it has thus been my premise that this capacity for pattern recognition, and the ensuing triggering of the imagination, can be an amazing source of creativity. Moreover, I believe that in general terms apophenia and creativity are intimately related, and I am in accordance with neurologist Peter Brugger, who suggests that both may be viewed as two sides of the same coin:

> The propensity to see connections between seemingly unrelated objects or ideas most closely links psychosis to creativity. Indeed, with respect to the detection of subjectively meaningful patterns, apophenia and creativity may even be conceived of as two sides of the same coin. One must keep in mind, however that the term detection as used here does not refer to a process of mere identification, to finding the solution to a perceptual puzzle. Rather, the assumption of meaningfulness in randomness always involves a subjective interpretation of spatial and temporal configurations. The creative arts acknowledge and take advantage of this purely subjective act of perceiving. They have always been inspired by chance and randomness to create works of art (Holoczek & Von Mengden 1992, Janson 1968) whose meaningfulness is, however, left to the interpretation of its viewers. (Brugger 2001; in Houran & Lange 2001, p.205)

Taken to extremes, a voracious appetite for pattern detection draws dangerously close to states of paranoia and psychosis. Marked apophenia is often attributed to high levels of dopamine in the brain, which affect the propensity to find patterns and significance where there are none, and in acute cases is treated as a symptom of psychosis and schizophrenia. However, whilst in the extreme it can be indicative of a psychotic condition, on a more normal level it is now known to be a ubiquitous feature of everyday human experience, and for the open and creative mind it is indeed a kind of 'happy genius':

> More conservative minds deprive coincidence of meaning by treating it as background noise or garbage, but the shape-shifting mind pesters the distinction between accident and essence and remakes this world out of whatever happens. At its obsessive extreme such attention is the beginning of paranoia (all coincidence makes "too much sense"), but in a more capacious mind it is a kind of happy genius, ready to make music out of other people's noise. Either way, the intelligence that takes accidents seriously is a constant threat to essences, for in the economy of categories, whenever the value of accident changes, so, too, does the value of essence. (Hyde 1998, p.100)

In the context of art making, intentional, self-aware, creative apophenia can then be seen as a deliberate manipulation of ambiguity to explore the potential and the capacities of our brain and our senses. In the creation of art –as well as in experiencing art– the making of interesting connections between diverse, varied, and often unexpected subjects is enriching and fascinating. With this spirit, we constantly discover and reveal all kinds of patterns that we join together at many different levels.

1.4 AMBIGUITY, LIMINALITY, THE TRICKSTER AND THE 'SONIC BLOTSCAPE'

One of the underlying central ideas underpinning my work with sonic phantoms, therefore, is that our world is inherently ambiguous and uncertain, and requires interpretation. This ambiguity leads to specific kinds of experiences, which are by no means passive but instead active. Auditory perception, as we normally understand it when we refer to the act of listening, is not a passive process. Our eardrums may be vibrating, but to eventually perceive something as a listening experience we must execute the neurological interpretational processes that give rise to perceptual patterns. We organise the acoustic input by perceptually grouping, fusing, segregating the streams of stimuli, so as to appreciate meaning, structure or pattern (Bregman 1994).

'Auditory Scene Analysis' (ASA) is a fundamental aspect of hearing and speech perception (Bregman 1994). It describes how the auditory perceptual system analyses and makes sense of a noisy and chaotic complex acoustic world dividing it into individual coherent auditory components or meaningful events of interest. ASA is essentially how we perceptually *group* and *segregate* various sound sources. When we identify a single speaker in a crowded noisy room we are in fact carrying out the task of auditory scene analysis. The mental auditory images of different sounds have been described as 'auditory streams' and the segregation or partitioning of auditory streams is often referred to as 'auditory streaming' or 'auditory stream segregation'(Bregman 1994; Snyder & Alain 2007; Pressnitzer et al. 2008; Pressnitzer et al. 2011; Moore & Gockel 2012).

The more ambiguous the perceptual scene or sensory material, the more actively we need to work to make sense of it. In art, we are often rewarded aesthetically after we have spent some time figuring out ambiguous scenes. In this context, our approach is an aesthetic one, whereby we are perceptually open and willing to suspend certain critical faculties and gain pleasure from investing time in finding patterns or meaning that may not be instantly obvious.

In terms of working with sound, I propose that this active effort results in a heightening of the listener's auditory experience as he/she actively participates in the perceptual process. I believe that creating certain purposely ambiguous relationships with the music pieces is a fundamental prerequisite

for allowing such enticing multiple listening perspectives to clearly take place. When working with such ambiguous sonic textures, an aesthetic mode of listening will greatly influence which patterns and details –and to what extent– will emerge into awareness. How active is the listener's interaction with the piece will dramatically affect the musical experience. This could of course be a general statement for most music pieces, but in the case of deliberate and meaningful ambiguity I see such a degree of engagement as a necessary prerequisite for the essence of this particular type of musical and sonic experience to manifest.

I find this development of intentional multiple listening perspectives particularly appealing as a compositional aesthetic. As I believe it will become evident from the different music pieces that make up this PhD dissertation, this specific type of ambiguity pervades all my work. Some sonic phantom patterns arise as a consequence of the deployment of multiple and simultaneous potential auditory 'images' or scenes, which will either reveal themselves or perceptually dissipate upon different listenings. In my compositions I have intentionally worked with our propensity to experience apophenia when faced with ambiguity. I play with sonic materials that are either naturally ambiguous or have been composed to attain this quality, in order to exploit the potential for apophenia to manifest, bringing with it the phantasmatic presence. I have developed and adopted many diverse, and somewhat unorthodox, approaches and techniques to achieve this aim, which I will elaborate on below when presenting each specific compositional project of this PhD. This has resulted in works where, for example, within formless, abstract or noisy textures we begin to hear voices or imagine voice-like forms or entities.

In this context, I frequently use the phrase 'in-between moments' to describe the shape-shifting world that I create. I am drawn to the creative potency of such liminal spaces (from *limen*, Latin for threshold), which are inherently ambiguous, lying *betwixt and between* one thing and another. Deeply connected with this concept of liminality, as elaborated first by ethnographer Arnold van Gennep (Gennep et al. 1961) and later by anthropologist Victor Turner (Turner *et al.* 1995), and latent throughout my artistic practice, is the primordial figure of the shape-shifting, confusion-sowing, gleefully equivocal 'trickster'. By many accounts, the trickster, aptly described as the 'God of the in-between' (Hyde, 1998), prefers to hang out in doorways, in the in-between spaces, than in the rooms themselves. Concepts linked with the trickster figure, such as boundary crossing, boundary loss and blurring of distinctions (Hansen 2001), provide a framework with which I can relate the ambiguous shifting of 'figure' and 'ground' (to use the classic visual analogy) in my own work. When working with intentionally ambiguous figure-and-ground relationships, boundaries have to be deliberately blurred creating the essence of 'anti-structure'(Turner et al. 1995), which offers the conditions for multiple perceptual interpretations of material.

Figure 4|The primordial figure of the trickster throughout the ages and across cultural contexts: Loki, Duchamp & Bugs Bunny |

I feel that the most substantial creative discoveries of my working process –as it probably is the case for many other artists– often occur in-between the intentional and the accidental. In a book that has been very influential for me, 'Trickster Makes this World', Lewis Hyde (1998) uses the elegant metaphorical phrase 'a net to catch contingency' to refer to the process in which, through happenstance, the happy accident of creation is born to those with the insight to recognise it. Most of my working process is initially exploratory in nature and driven to a large degree by happenstance and accidental discovery but in which I am constantly on the alert for sonic phantom-inducing conditions.

In addition to 'contingency', I use the term 'sonic blotscape' to refer to hands-on, practical, experimentation, which can lead to fruitful accidental sonic discovery. As part of a long lineage that would include Protogenes' and Leonardo da Vinci's attention to accidental stains for inspiration in painting (Leal 2009; Woodfield 1996; Gombrich 1973; Gamboni 2004; Gamboni 2005), as well as the old German children's game 'Blotto' (klecksographie) and Rorschach's inkblot psychological test (Turner n.d.; Choca 2013; Foster 2013; Framingham 2011), 'Blotscape' is a term created by Janson (Janson 1973) to describe the visual inkblot method of Eighteenth Century painter Alexander Cozens:

> [T]he British landscape painter and drawing teacher Alexander Cozens [...] published an illustrated treatise entitled A New Method of Assisting the Invention in Drawing Original Compositions of Landscape. It describes "a mechanical method... to draw forth the ideas" of artists, which consists of making casual and largely accidental inkblots on paper with a brush, to serve as a store of compositional suggestions. (Janson 1973)

My 'sonic blotscape' would accordingly be an equivalent territory of apparently formless, or seemingly unrelated, sonic geography, which would however be full of potentially countless auditory versions of the 'chance image' with an ever-changing multistable quality [as a form of *de facto* definition, I will describe in the following chapters the specific and practical ways in which I have

attempted to create such a perceptual generative territory with different sound materials]. For the apophenic, pattern-forming, open mind this is a fertile terrain for the induction of sonic phantoms. As we can 'compose' landscapes out of wall stains or inkblots, so we can generate voices from noise. Even da Vinci heard those phantom voices:

> This is the case if you cast your glance on any walls dirty with such stains or walls made up of rock formations of different types. If you have to invent some scenes, you will be able to discover them there in diverse forms, in diverse landscapes, adorn with mountains, rivers, rocks, trees, extensive plains, valleys, anthills. You can even see battle scenes and movements made up of unusual figures, faces with strange expressions, and myriad things which you can transform into a complete and proper form constituting part of similar walls and rocks. These are like the sound of bells in whose tolling, you hear names and words that your imagination conjures up. (Vinci 2005, p.175)

The sonic blotscape functions as my own net to catch contingency. It activates my listening imagination so I can explore the auditory territories that give rise to sonic phantoms. It inspires, projects and suggests meaningful forms and encourages an intriguing and heightened *Gestalt*-like listening experience. It is important to stress here that my sonic phantoms were first discovered and unconsciously experienced before any compositional insights were made. It was only later that I set out to consciously recreate, re-enact, explore, highlight and manipulate these multiply switching figure and ground patterns to induce the phantasmatic.

2 INDUCING THE PHANTASMATIC

2.1 REALMS OF SONIC PHANTASMATIC EXPERIENCE

Anicius M. S. Boethius, a philosopher of the late Roman-Byzantine Empire, summarised ancient Greek thought on music in his 'De Institutione Musica'[3], written at the end of the 5th century (and which will eventually be one of the first musical works to be printed in Venice in the 15th Century). In these 'Principles of Music' he describes a comprehensive system for music classification –in fact, a conceptual framework for the very concept of music and its practice – that remained in place in the Western world as the main reference for musical understanding for over a millennium. This system considered the following categories of music:

> ***Musica Instrumentalis***: instrumental music.
>
> ***Musica Humana***: the internal music of the human body; human body and spiritual harmony.
>
> ***Musica Mundana*** or ***Universalis***: the Pythagorean 'Music of the Spheres'; a metaphysical principle embracing the non-human philosophical world / cosmos as generator of an imaginary harmonic music caused by the movements of celestial bodies.

This was an inclusive and universalising system that determined the organisation of music making expanded beyond mere classification to include and recognise that there is also a level of music beyond the instrumental and the human.

In this work I have used a categorising system that is inspired by such universalising openness in the acceptance of 'music' –and related aesthetic/perceptive phenomena– as being potentially generated in realms other than the more traditionally musical. In relation to my own creative practice, however, I am not so much interested in the classification system *per se*, or in the Pythagorean-Boethian tradition *as is*, but rather in the comprehensive vision that expands the 'musically possible' besides and beyond the instrumental and the anthropogenic. Thus, for example, the *Musica Mundana*'s 'Music of the Spheres' is for me a very interesting and inspirational historical example, in the context of Western philosophy, of a level that is beyond human intervention; music beyond the *compositional* reach of humans. In that spirit, my use of the corresponding realm of *Mundana* is an expanded version that aims at embracing all of nature (and not only the extra-terrestrial / cosmic), as we would commonly understand it today.

It was, in fact, as an *a posteriori* realisation in my working process that I recognised a significant analogy between the span of my personal concept of music, –and of compositional work– with the broad classification system of Boethius. I have composed a wide spectrum of sonic pieces with materials from diverse sources and origins: from drawing on amplified objects, to using text-to-speech software applications, to the choruses of frogs and insects in rainforests, as well as instruments and voice. To me, they are all equally musical. Fundamental to my work is an aesthetic and emotional conception of sound in which *Mundana*, *Humana* and *Instrumentalis* would be equally valid as music; as they were –in a different musical and conceptual world– for Boethius.

The four main chapters of this PhD thus structure the presentation of my sonic phantom compositional explorations according to four realms of sonic experience that I have called *Phantasma Instrumentalis*, *Phantasma Materialis*, *Phantasma Humana* and *Phantasma Mundana* or *Naturalis*. Each chapter focuses on a composition project that explores the phenomenon of sonic phantoms in one of these realms. Additionally, each chapter or sonic realm highlights particular uses, methods, processes or implementations of phantom induction in my own music, contextualized by relevant ideas and inspirational research from a wide variety of sources, which are discussed in relation to each particular project.

Phantasma Instrumentalis would probably be the most immediate category in a traditional musical sense, and the only one directly equivalent to a Boethian category: the realm of the musical instrument. This realm is represented by my project '**Harp Phantoms**'[AV01-AV14], a collection of compositions for 'prepared' amplified harp encompassing both live-performed and studio-manipulated pieces. Notwithstanding its clearly instrumental nature, this project reveals, among other things, relatively unexpected outcomes for an instrument (at least in the traditional sense), such as the generation of noise fields and voice-like sonic phantoms.

Phantasma Materialis is a realm that I introduce to account for the significant and extensive body of work developed, for many decades now, in contemporary sonic practices dealing with the musicality of objects. It basically refers to the non-instrumental objects that have ultimately become 'instrumental' in an extended musical sense. This realm is exemplified by my project '**Drawing Phantoms**'[AV16-AV24], an amplified, trance-inducing drawing ritual involving paper, pencils or crayons and a supporting, resonating surface. This work directly relates, and is contextualized with, research and artistic practices on the creative –and more-generally, cultural– fields of trance and ritual.

Phantasma Humana would essentially refer to the more straightforward and specific –rather than the Boethian mystical or esoteric– expression of human bodily-produced sound represented by the voice. This realm is exemplified by my project '**Vocal Phantoms**'[AV25-AV44], which centers on the

generation of sonic phantoms using the human voice (both real and synthetic) and language, as starting points for core compositional material. As part of the development of this project, I carried out research on both the vocal techniques of the Inuit *Katajjaq* [see glossary] and Georgian polyphony, in expeditions to Baffin Island in Nunavut (2010) and to Georgia in the Caucasus (2012).

Phantasma Mundana or ***Naturalis*** is my proposed realm for all sonic phantom phenomena generated from 'nature' in a contemporary philosophical sense; i.e., the non-human, non-artificial, whether cosmic or terrestrial, but again in this case with a more direct grounding on perceivable sonic entities rather than mystical spheres. It is represented by a series of recordings and compositions, under the title of '**Natural Phantoms**'[AV49-AV58], exploring the phantom-producing polyphony of different natural environments. These sound pieces have been created from original source materials recorded in several field recording trips I carried out, in partnership with sound artist Francisco López, to rainforest and savannah environments in Brazil (2011), Borneo (2012), Cambodia (2013), Australia (2013) and South Africa (2013).

2.2 COMPOSITIONAL PHANTASMATIC STRATEGIES AND TECHNIQUES

Regardless of the sonic realm, the specific project and the particular instruments, materials or devices involved, in my practice I have used a number of strategies and techniques to bring out the sonic phantoms. I have developed these as compositional tools while researching and experimenting with diverse sonic materials, as well as during the compositional work itself.

With the aim of providing a generally applicable overview, I have tried to identify what I consider to be the truly substantial processes that made up those strategies and techniques. When analysed this way, one eventually realises that the essence of such particular compositional tools is naturally widespread (and also beyond the domain of music, into other realms such as the artistic and the ritual/religious). Here I briefly outline these essential categories. The details about the implementation of particular strategies or techniques through specific instruments, devices and ideas are described in each one of the project chapters.

2.2.1 Repetition

> Repetition changes nothing in the object repeated, but does change something in the mind that contemplates it. (Hume et al. 1978)
> Repetition is not repetition [...] the same action makes you feel something completely different by the end. (Pina Baush in Walker 2014)

Repetition is a general strategy used to give rise to a multiplicity of perceptual, emotional, aesthetic or semantic effects. It is a traditional mechanism of ritualisation and trance induction (see, e.g. (Bell 1992; Bell 1997; Dissanayake 2000; Wier 2009;), and to some extent it appears as such in my work. For example, in both my 'Harp Phantoms' and 'Drawing Phantoms' projects there are explicit ritualised actions and the performer might reach a trance-like state by virtue of repetitive manual actions on the harp or systematic repetitive circular motion on an amplified drawing surface.

One of the consequences of this type of repetition is the 'semantisation' of sonic elements that were initially meaningless and would remain so in the absence of repetition –a clear example of apophenia. This semantisation commonly produces 'speaking' sonic phantoms, apparent voices with typically brief meaningful 'messages' (repetition of short fragments of recordings is one of the techniques of EVP, Electronic Voice Phenomena, or the recording of the voices of the dead: see chapter 4 and glossary).

Interestingly, repetition can also produce precisely the opposite effect, i.e., the dissipation of meaning by 'semantic satiation' (Jakobovits 1962), the common phenomenon we experience if we insistently repeat a familiar word until we realise it has become semantically meaningless. This is the case in some aspects of my project 'Voice Phantoms', where extreme repetition of real and synthesised speech first dissipates the original sense and then ends up transforming into all kinds of remarkably specific sonic illusions –typically non-semantic but referring to imaginary objects; another case of apophenia– that are completely different for different listeners.

These types of sonic phantoms produced by repetition are characteristically naturally musical (in a traditional sense) for most listeners, because of the fundamental prominence of rhythm and repeated structures in most music. The generation of musicality is virtually an instantaneous phenomenon in all forms of 'looped music' based on non-musical sounds (e.g., sound artists like Croiners[AV59], Manon Anne Gillis[AV60], [The User][AV61]; different strands of electronica; locked-grooves' records[AV62, AV63]). It is equally the case even for standard film materials with diegetic sound when subjected to extreme repetition, as in the work of visual artist Martin Arnold.[AV64]

Repetition as a mechanism also reveals additional, inherent layers of alien or hidden alternate musicality within music or musical sound, by perceptually deconstructing the original sounds into separate polyphonic, rhythmic or harmonic layers that become audible only by means of repetition (e.g., as a prototypical feature of Western contemporary musical 'minimalism' (Strickland 1993; Reich & Hillier 2002; Gann 1997; Nyman 1974); or, even more specifically, in the work of artists as diverse as Maryanne Amacher[AV65], John Oswald[AV67] or Oval.[AV66]

2.2.2 Persistence

Another traditional strategy for trance induction –and for the generation of sonic phantoms from my particular perspective– is what I would choose to call 'persistence'. Clearly a universal phenomenon, many cultures have developed and established patterns of persistence in their rituals and cultural practices that operate through long duration, insistence, endurance, perseverance, tenacity (Becker 2004; Rouget 1985; Wier 2009; Aldridge & Fachner 2006).

Persistence is indeed commonly manifested through repetition; such is the case for a large number of shamanic and ritualised practices that use –and necessarily require– instruments and voices through extended repetition over hours or days without pause or respite.[AV74] Such was the case as well, if we refer to the Western musical realm, of Satie's 'Vexations'.[AV75] Interestingly, contemporary popular culture has also very recently generated its own manifestations of repetitive persistence where sound is paramount, as in the extensive and somewhat intriguing field of YouTube video mantras/environments with hours of repetition of short loops (among a plethora of mesmerising exercises, prime examples could be: '10 hours of darth vader breathing'[AV68], 'Can You Survive 10 Hours of Patrick Star Asking "Who You Calling Pinhead?"' [AV69] or 'Puddi Puddi 10 hours'[AV70].

But persistence does not necessarily imply repetition. As a differentiated mechanism, it would probably be best characterised by its effects of saturation, habituation and endurance. These, in turn, would typically lead to different degrees of hypnotic immersion, a fertile territory for uncertainties, illusions and hence sonic phantoms. Already classic examples of this in Western music are the work of Morton Feldman (particularly his 6-hour long 'String Quartet No.2'[AV76]); Stockhausen's 'Licht', a 29-hour cycle of seven operas[AV77]; or Phill Niblock's[AV71] and Eliane Radigue's[AV78] several-hour pieces. In this context, the epitome of duration is of course the work of American composer LaMonte Young, with his ensemble 'The Theatre of Eternal Music' and his ongoing composition/immersive environment of 'The Dream House' in New York City, which has been continuously unfolding for over twenty years now (Cultures of Conservation website n.d.- Dream House).

Besides these more well-known examples, an entire musical genre that has been coalescing since the 1970s, commonly known as 'Drone Music' or 'Ambient' (although both terms are not exactly equivalent; see (Grimshaw 2012; Prendergast 2000; Cox 2007; Ross 2009), specifically explores persistence and immersion. German bands Popol Vuh and Tangerine Dream, as well as British artist Brian Eno –and before them some of the abovementioned artists (Niblock, Radigue, Young)– are considered to be at the origin of this genre's genealogy, which today would include the work of hundreds of artists worldwide (e.g., Swarm of Drones - SONM Archive website n.d., Prendergast 2000). In this context, one recent prime example of persistent immersion without repetition is the piece "untitled#305 [seven nights]" by sound artist and composer Francisco López, a 56-hour long drone piece released on a SD memory card (López – Discogs website n.d.).

I have used persistence to a greater or lesser extent in all the pieces in this portfolio, but it has been a particularly relevant strategy in my 'Harp Phantoms' and 'Drawing Phantoms' projects. In both cases, I have explored and promoted ritualisation and trance-induction through –among other things– extended duration (five or more hours in the case of 'Harp Phantoms'). An extended temporal framework is essential to promote the necessary engagement and perceptual openness to give rise to heightened states of sonic experience that, to some extent, bypass or inhibit our usual cognitive-aware states (inner dialogue, critical judgment, etc.). Persistence has been for me a way to entrance both listener *and* performer into an immersive absorbed state of embodied participation in the music.

2.2.3 Layering

In my work there is a marked emphasis on vertical modes of organisation as opposed to horizontal forms of sonic structure. By 'vertical' I mean simultaneous layering of sonic patterns, rather than sequential and temporal organisations. This focus on verticality promotes a multi-perspectival quality of listening. There is time to zoom into details, to choose to attend to alternate pattern combinations, to inhabit the material. One can shift attentional focus between overall sonic appearance and ever-changing details of features that can be appreciated through a perceptual zooming-in and out of patterns that are rising and submerging within the textural continuum. A multiplicity of perspectives on the same material is thus naturally possible; i.e., an ideal fertile ground for sonic phantoms to arise.

Most of my pieces are constructed from multi-layered simple component elements or patterns. Stratification and simultaneity can give rise to outstanding levels of complexity and intricacy. One of the ways in which this can manifest is by 'densification'; that is, by a significant accumulation, accretion, aggregation or build-up of simultaneous sonic layers that give rise to emergent textures and sonic fields. Paramount examples in contemporary music of explicit and thorough exploration of this

territory would be György Ligeti's 'Poème Symphonique (for 100 Metronomes, 10 Performers and 1 Conductor)'[AV79] and 'Atmosphères'[AV80], Iannis Xenakis' 'Persepolis'[AV72] , Krzysztof Penderecki's 'Threnody (for the Victims of Hiroshima) for 52 strings'[AV81] or Paul Dolden's massively-layered instrumental compositions like those in his album 'L'Ivresse de la Vitesse'[AV73]. I have employed densification to some degree in all the pieces presented in this portfolio but it is particularly present in my 'Drawing Phantoms' project, where it becomes the foremost mechanism for the induction of sonic phantoms.

The other major manifestation of layering is 'interlocking'. Interlocking patterns are alternating patterns of sound and silence between several instruments, voices or sounds that combine to make a 'whole' or emergent *Gestalt*. They are usually dovetailed and in many cases equally spaced in time, but the paradoxical result is typically an outstanding global complexity. Intricate sonic tapestries emerge from simple repeated patterns –occasionally magnified by fast-paced, machine-like repetitions at the limits of human perceptual temporal resolution– that form larger interlocking and complex structures. This often leads to the production of densely evocative and hypnotic structures such as the Amadinda or Akadinda Royal Court Music From Uganda.[AV105] The essence of this kind of pattern construction is that no one part contains all of the notes or sonic elements, but instead they share common elements (such as common borders). Sonic phantom patterns produced by interlocking are always a resulting image of the perceptual processes of grouping or segregation of the component parts.

From a certain perspective, *sensu lato*, most music obviously contains some degree of interlocking. Distinctive cases of sonic phenomena such as sonic phantoms, acoustic illusions or explicit aural ambiguity, however, only take place when interlocking constitutes the core of the compositional process and generates an internal structural world; when it is the focus of music-making to the point of becoming the aesthetic and structural essence of the piece created.

A general analysis of different types of instrumental and vocal music from around the world (both traditional and non-traditional) in which we find examples of prominent sonic phantoms, reveals that these are often either a byproduct of, or in many cases intentionally produced by interlocking techniques such as hocketing (England 1967; Cohen 2003; Grauer 2011). Examples of polyphonic traditions which make use of the interlocking principle as a structural technique are abundant in Africa alone and feature in the music of the Kpelle people from Guinea/Liberia (e.g. horn ensembles, bush-clearing, funeral songs)[AV82], the Aka and Ba-benzele from Central Africa[AV83], Baka people from Cameroon[AV84], the mbira music of the Shona of Zimbabwe[AV85], panpipe ensembles of Ouganda / Busoga, Banda-Linda Horn ensembles from central Africa[AV86], etc. Other diverse examples include

the hocketing gamelan music from Indonesia, the hocketed and yodeled vocal polyphony known as 'Krimanchuli' in Georgia[4][AV87], the Lithuanian Skudučiai multipipe flute music and lesser-known Russian panpipe traditions from the Kursk province (Velitchkina 1996; Grauer 2011; Jordania 2006).[AV88] Musical examples such as these although from very different parts of the world have much in common in that they all utilise the principle of interlock and give rise to distinct sonic phantoms as a result. It is thus a useful way to generate more complex results from simple and limited sources. The technique can also be used to create pseudo-polyphony within one voice or instrument to give the impression of multiple concurrent parts. Composers in the Baroque period such as Telemann with pieces like his 'Sonata for Recorder in C major, (TWV 42-C2)'[AV91] and Bach with pieces such as 'Partita for solo flute in A minor, BWV 1013'[AV92] frequently played with pseudo-polyphonic textures in solo instrumental works where rapid alternation between a high and a lower register, gives the effect of two interleaved melodic lines with a convincing degree of separation. Yodeling is another striking example of pseudo-polyphony found in many cultures all over the world (Plantenga 2003), as is the worldwide practice of vocal percussion 'Beat boxing'.[AV89] The Katajjaq or vocal games of the Inuit[AV90], is another example of a practice that makes use of tightly interlocking vocal sounds to create deliberately ambiguous phantoms results. I discuss the Katajjaq later in 'Phantasma Humana'.

Interlocking techniques have been elegantly employed by Schoenberg and Webern with the technique of 'klangfarbenmelodie', Schoenberg in particular with the third of his 'Five Pieces for Orchestra (Op. 16)', and Webern with his Orchestration of the six-part ricercar from the Musical Offering of J. S. Bach (1935)'(ACOUSMATA n.d.; Erickson 1975). As is well known, Steve Reich was directly influenced by African music and interlocking techniques and used the term 'resultant patterns' to describe the emergent effects generated in his own process-based compositions (Reich, 2002). Ligeti was also known for his admiration of African music and acknowledged that he was also directly influenced by it. In the 1980s Ligeti was already familiar with the research of Simha Arom on the music of Central Africa (Arom, 1991; Chemillier et al. 2003), as well as the theories of Gerhard Kubik on inherent rhythms (Arom, 1991, Kubik 1962), all of which provided substantial inspiration for his compositions such as his piano etudes no's 8 'Fem' and 10 'Der Zauberlehrling[AV93, AV94] amongst many others in the 1980s and 1990s. Ligeti was fascinated by what musicologist Scherzinger called its 'psychological doubleness' (Scherzinger 2006) and in certain works he sought to achieve a kind of illusory musical space as in 'Continuum' for harpsichord[AV95], inspired by such music as that of the royal courts of Buganda and the Banda Linda horn ensembles. Other specific works worth mentioning for sustained use of interlocking techniques include, Louis Andreisson's 'Hoketus' for mixed ensemble 1975-1977[AV96], Charlemagne Palestine's 'Strumming Music', solo piece for piano

1974[AV97], Meredith Monks 'Hocket' for two voices[AV98], Michael Gordon's 'Timbre'[AV99] and 'Pléïades', for 6 percussionists (1978) by Xenakis.[AV100]

Finally, the interlocking of simple elements is of key compositional interest for me in my own quest to produce sonic phantoms and is at the core of all the compositions in my projects 'Harp Phantoms', 'Voice Phantoms' and 'Natural Phantoms'.

2.2.4 Noise

Noise is perhaps the most natural and immediate candidate for the induction of sonic phantoms. This might be an intriguing statement for some, but I believe this would be so only because of the mainstream conception of noise as something like occasional undesired sound. In stark contrast with this traditional limited view, noise has undergone in recent times a drastic and profound transformation of status (e.g., Attali 1985, Hainge 2013) that has propelled its role and significance to –among other things– a position of 'generative matrix' of all sorts of potential contents and effects. Noise not as a contamination or corruption of the signal (in the classic paradigm of Information Theory) but rather as a comprehensive field that contains –undifferentiated and simultaneous– all the possibilities, all the frequencies, all the colours, all the values.

This change is not only aesthetic, but also ethical, political and ontological. From our current perspective, we could see this as a revolutionary shift, but it is important to realise and acknowledge how much of the essence of such a perspective is naturally integral to other cultures –and it has been so for a very long time. The epitome of this is probably the Kaluli people of Papua New Guinea (Feld & Kaluli People 1981, Feld 2012), who experience the broadband noise of waterfalls as a natural all-embracing source that potentially contains all melodies of human music. As we know, this would run strikingly close to an understanding of white noise (and other versions, like 'pink' or 'brown' noise, or any other form of broadband noise) as a universal simultaneous container of all sonic frequencies, and therefore a generative matrix of sonic possibilities.

As mentioned before, we naturally operate as apophenic creatures, constantly creating meaning from apparently meaningless, formless, orderless, shapeless, chaotic or indistinct fields of perception. I have intentionally generated and used noise in such a manner as a preeminent factor for the induction of sonic phantoms. In both my 'Harp Phantoms' and 'Drawing Phantoms' projects there is a deliberate production of substantial amounts of noise, whose aim is precisely to give rise to an embracing generative field for sonic phantom induction. Sonic phantoms thrive in such a perceptual environment. This strategy, which we could readily call 'noise field generation', is in fact present –implicitly or explicitly, consubstantially or incidentally– in a wide variety of musical practices, from the

overwhelming and all-embracing onslaughts of so-called 'noise music' (Ross 2009; Hegarty 2007; Hainge 2013)[AV101, AV102] to the 'Mbira' thumb pianos with bottle caps and other objects of Sub-Saharan Africa.[AV103]

2.2.5 Accentuation

I have chosen the term 'accentuation' to encompass the numerous strategies and techniques to intentionally highlight, expose or emphasise specific sound elements or features from a relatively undifferentiated sonic field or ground. This is somehow the inverse –or perhaps more precisely, the complementary process– of the noise field generation. That is, once we have generated a rich and fruitful background field, we actively bring out and reveal sonic phantoms as a result of a willful and conscious procedure. *Actively* is of course key here, since this kind of strategy implies a more artificial generation of sonic phantoms: not only we set up a process of induction but we forcefully help perception to reach an apophenic state.

In technical terms this is accomplished with relatively simple and fairly common techniques, such as equalisation of the audio signal (either live or recorded) or specific reinforced actions on instruments or objects to attain the desired level of emphasis for the sonic phantoms to become patent.

This is of course a form of purposeful manipulation of the classic figure/ground perceptual situation. Different possible levels of intuitive shifting of attention between sonic planes or phases are deliberately tweaked to modify what in normal conditions would be the immediate and usual figure/ground relationships of perception.

Such conscious and intentional reinforcement of specific sonic features in the music with the aim of generating sonic illusions takes place, for example, in the Amadinda or Akadinda xylophones of Uganda: phantom patterns that arise in the music can be forcefully accentuated, after becoming hearable, by the musicians that caused them or by specialized additional musicians that specifically reinforce these phantom patterns with their playing.[AV104, AV105]

I have extensively used accentuation in my work to generate sonic phantoms, by means of equalisation and filtering (both live and in studio recordings) of sonic materials. I have also actively highlighted specific sound features –and thus generate sonic phantoms– by analysing certain instrumental actions and consequently providing precise instructions for performers to dramatically emphasise their actions and hence the sonic results.

3 *PHANTASMA INSTRUMENTALIS |* The Realm of the Instrument

COMPOSITIONAL PROJECT: 'HARP PHANTOMS'

3.1 SONIC EXPLORATION OF THE INSTRUMENT

There are many different approaches and techniques for obtaining sonic phantoms in the realm of the instrumental. In this chapter I will discuss my own use of interlocking techniques built from modest and simple starting points, coupled with other techniques such as layering, in order to form intricate, dense, evocative and hypnotic structures with phantom effects of pseudo-polyphony.

I have created many different pieces with various instruments exploring phantoms in the realm of the instrumental; however, here I will focus mainly on a project that comprises a number of different works, which evolved from a period of exploration with a prepared harp. These project pieces are collectively called 'Harp Phantoms', and are centered on a prepared concert harp with local and ambient amplification. They evolved from action-based process work, developed whilst working with a very direct way of approach to the harp as a complex sound generator and resonator.

Figure 5 | Barbara Ellison. Setup for performance of 'Harp Phantoms' at Het Nutshuis space in The Hague, The Netherlands, 2011[Photograph by Angélica Vázquez] |

A large part of the practical process carried out in this project involved making an in-depth exploration of the harp itself, and its preparation, in various configurations and setups. From the onset of this process, I was keen to discover in a practical way the sound-making potential of this instrument, extending its sound potential beyond its historical and more traditional musical context. I began with a hands-on creation of all kinds of 'sonic blotscapes', which would trigger the sonic imagination, as opposed to thinking up the sounds in advance, notating or preparing them, and then getting the player / performer to produce them.

My explorations then led me to develop a stockpile of preparation techniques and gestures, which gave rise to varying sets of textures and processes. The compositional material was ultimately derived from the sonic blotscapes generated by the prepared instrument / object / player / bistable system. Whilst developing the piece at this stage, I was fortunate to be able to work directly with harpist Angélica Vázquez (Spain) and, later in the process, with harpist Rhodri Davies (UK), both of whom devoted much time and attention to the exploratory process. We spent many hours together workshopping the possible playing strategies and experimenting with adaptations to these strategies made through practice. These techniques will always depend to some degree on a level of adaptation, responding to factors such as the acoustics of the space, instrument tuning and preparation, player, time available for the performance itself and so on.

Figure 6 | Barbara Ellison during one of the 'hands on' exploration sessions of the Harp | [AV107]

‘Harp phantoms’ is my overall title for the collection of pieces that evolved from a first initial scored piece for live performance in Huddersfield, which originally had that same title[AV12], and which in turn emerged from the starting period of practical research with the harp. Formally, the first piece comprises of ten scenes, with each scenario focused on exploring a specific action or process, as it undergoes a process of ritualisation.

Each movement of the piece focuses mainly on one specific action / behaviour and is defined in as economical a way as possible, on a single page of the score. Each action is expressed textually by a series of directions / instructions along with accompanying diagrams and sound and video examples. I experimented with different ways to play using raw physical gestures with the harp. This way, and through a repetitive process, I discovered different ways to create a variety of sounds and textures, ranging from the very noisy (by means of scraping) to the harmonic (using bits of blu-tack adhesive material –the blue artificial clay-like material used for, e.g., attaching posters to walls).

The actions themselves produce cycles of repeated patterns, ranging from simple interlocked two-note ostinatos to repetitive glissandi gestures. Many of these pattern-producing actions make use of dovetail interlocking techniques (explained below). The actions were devised, constructed, deconstructed and ritualised through the initial practical experimentation stage, resulting in a working set of instructions, which aimed to reduce the actions to their bare essentials. In a sense, the actions themselves, because of their repetitive nature, function as a network of looping structures.

3.2 INSTRUMENT PREPARATION & 'SONIC BLOTSCAPES'

The following is a brief description of the preparation of the harp for 'Harp Phantoms', in order to transform the sound of the harp itself. Different techniques were devised and tested through a process of trial and error during practical workshops where I was fortunate enough to have individual access (and a generous amount of time) to a concert harp at the Royal Conservatory of The Hague.

Figure 7 Figure 8 |Experimenting with different materials to 'prepare' the harp in workshop session (foil, crocodile clips, metal rods, corks, piezo disk, paper, comb) |

Whilst preparations have been extensively explored in relation to piano preparations, their use with the harp in general is only beginning to be more widespread. Rhodri Davis's exceptional practice however does involve extensive use of various materials however in his experience many of the original techniques I devised had never been used before for transformation of the harp sound. The aesthetic of 'buzzing' sounds was integral to the timbre of these pieces (also inspired by similar noisy timbres of African harps and Mbiras[AV103]); indeed, most of the techniques and preparation strategies that I followed, described below, were selected because of their capacity to generate sonic blotscapes.

In the preparation of the instrument, many objects were added to the harp to create effects, which would intensify sonority or increase the noise-to-pitch ratio. The objects eventually selected after many tests were aluminum foil rings and sheets, blu-tack blobs, champagne corks, screws and sticks. The positions of the blu-tack blobs were eventually fixed and they were activated, directly or indirectly, by plucking the strings. The blu-tack material functions to create harmonics when the string

is plucked, as well as detuning the harp strings. As a compositional decision, I wanted to alter the tuning of the instrument, and this technique worked very well, without having to actually tighten or loosen any strings.

The foil rings were attached to strings at different points where the strings could vibrate against them. This creates a buzzing sound and is reminiscent of the noisy sounds which result from soft metal rings attached to African Mbira instruments; the noise fields generated by these means are believed to aid in the communication with the spirits of the ancestors (Kubik,1988; Berliner, 1993; Agordoh, 2005). These kinds of preparations function as noise field generators, as well as timbral transformers, creating extra sonic layers from which sonic phantoms arise.

The score of 'Harp Phantoms' itself (see score) includes necessary graphic and descriptive information that is, in fact, a documentation of the process of exploration and preparation of the instrument.

Figure 9 | Tools eventually chosen for use to alter the sound of the Harp. Part of the 'Harp Phantoms' piece score |

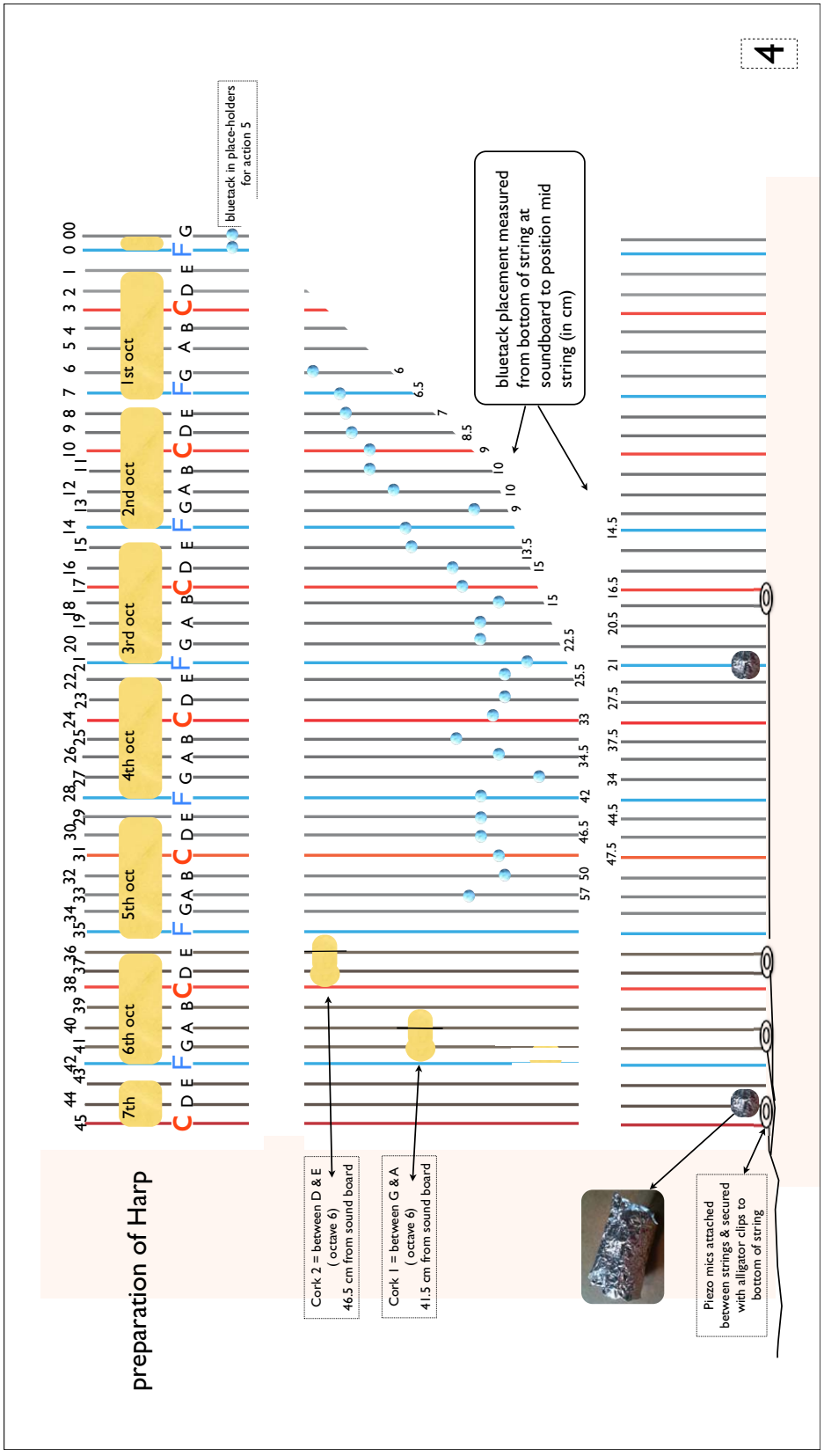


Figure 10 | Map of placements of 'preparation' objects. Part of the 'Harp Phantoms' piece score |

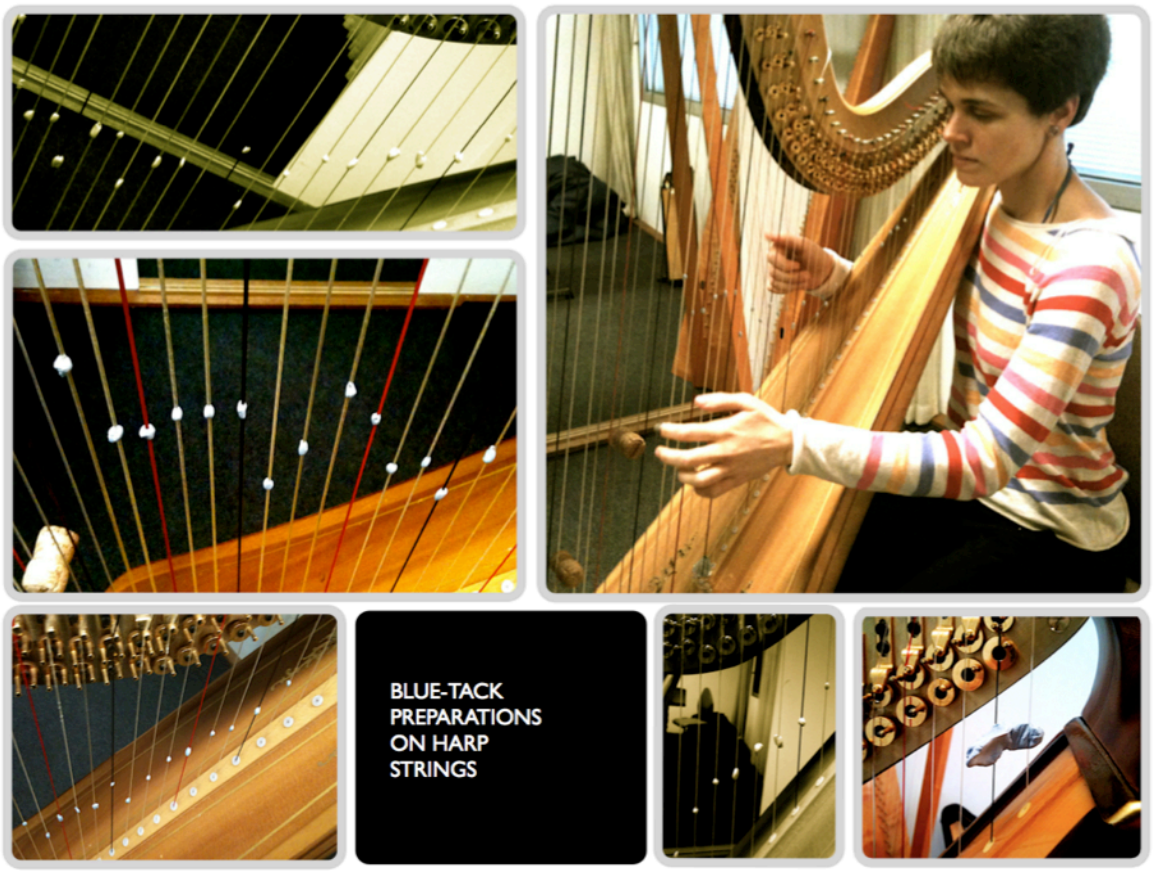


Figure 11| Harpist Angélica Vázquez during a workshop session [Photographs by Barbara Ellison]|

Blu-tack blobs were attached / tacked to the harp strings at specific points to produce a detuning of the string and to give a bell-like harmonic sound. This was one of the interesting discoveries during the exploration and experimentation phase of the work. The blobs are stuck on the strings at measured points. These points were practically determined to facilitate the bell-like sounds when plucked.[AV07a] Measurements of the blu-tack placement are indicated (in cm) from the bottom of the string at the soundboard to a position in the middle of the string. In reality, whilst these measurements were precise for the specific instrument I was working with at the time, I discovered that different harps require some adjustments; a bit of playing and testing the precise positions to attain the best sound to suit each particular string.

Aluminium rings were placed loosely around certain harp strings to create noisy buzzing artifacts and rattles when the string is plucked and scraped with a plectrum. Foil pieces were also loosely placed and threated around and between the strings for noisy timbral metallic effects.

Figure 12 | Foil ring example |

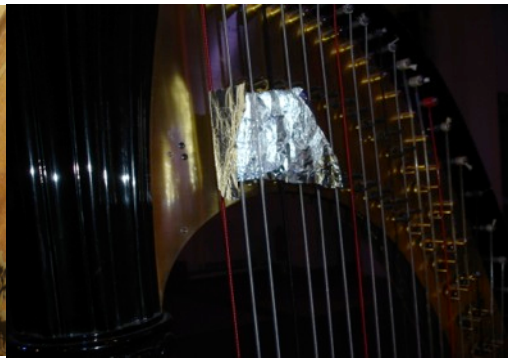


Figure 13 | Threaded vibrating foil example |

Champagne corks were also wedged in between strings, for percussive effect. At different moments in time during the performance of the piece, they are beaten softly with a stick-with- rubber ball, creating a low resonant, drum-like sound.

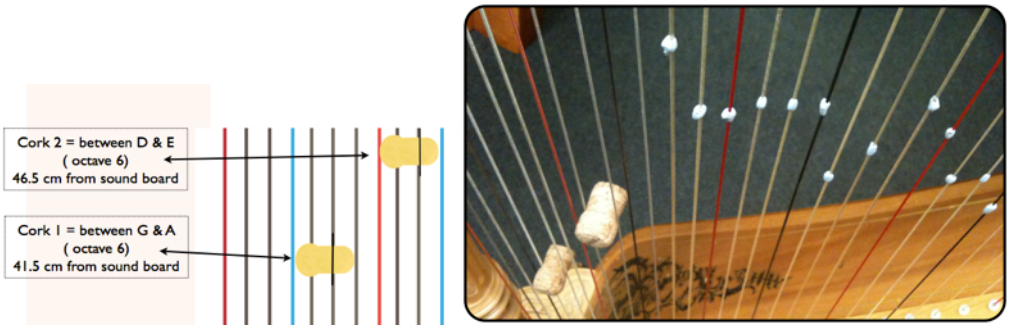


Figure 14 | Corks wedged between strings |

Piezo-electric microphones (also known as 'contact mics') were used for local amplification of the prepared strings with objects. At least five or more microphones were attached to strings near the base of the sounding board. I play with the fact that these microphones clearly bring out the more subtle sonic details of all the resonances of the instrument, which would normally go unnoticed without this close-mic amplification.

Figure 15 | Piezo-electric microphone used in the harp |

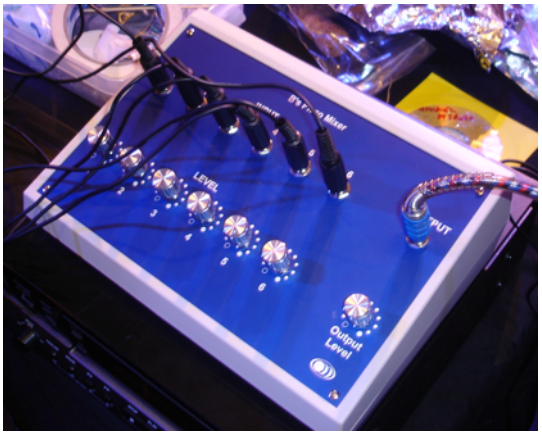


Figure 16 | My custom-made, purpose-built piezo mic mixer |

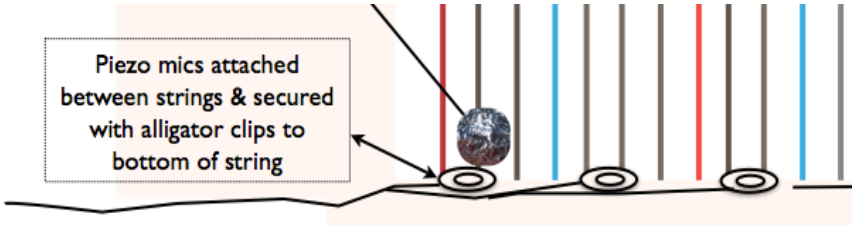


Figure 17 | Placement of piezo-electric microphones at the bottom of the harp strings |

A thin wooden food stick was used as a performance tool to generate an 'in-between' action, consisting of a quick repetitive back-and-forth motion with the stick between the strings. When set in motion this way at the base of the string, a nice resonant sound can be achieved. This results from the rhythmic contact between the amplified wood of the stick and the harp string gut.

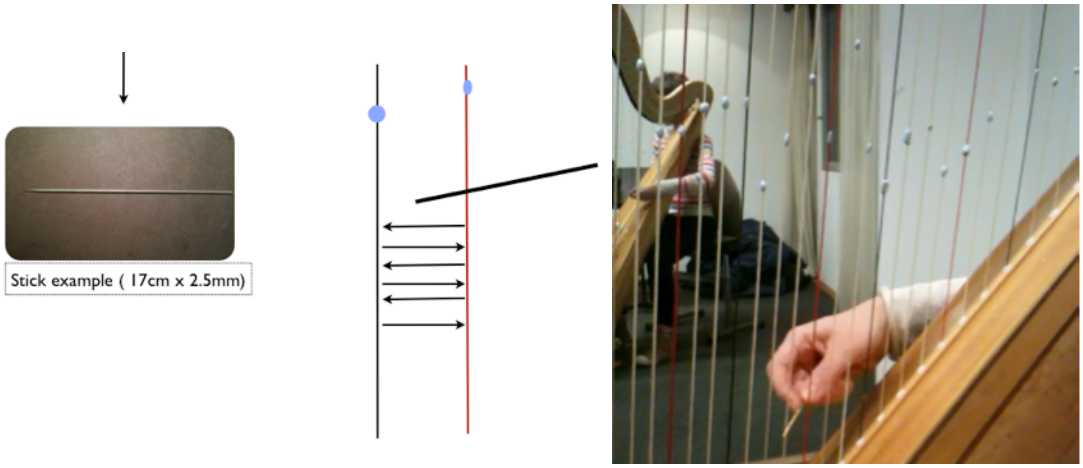


Figure 18 | Wooden stick performative action between the harp strings | [AV03a ,AV03]

A large metal screw was also used to produce a 'third-bridge guitar' effect to alter string pitch. One hand holds the screw against the string as a guitar bridge, moving up and down for pitch control, while the other hand is plucking the string with the wooden stick. [AV02, AV02a]

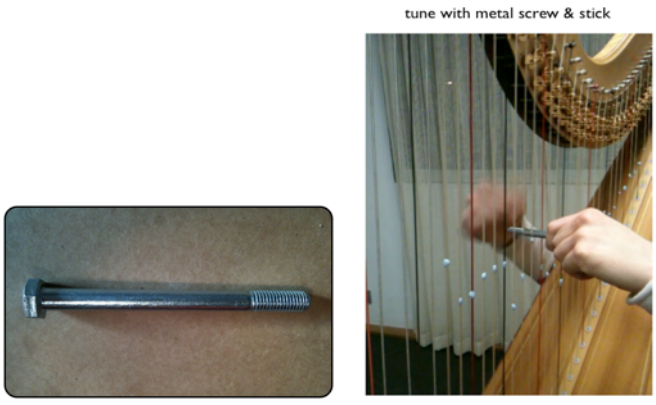


Figure 19 | Large metal screw (12.5 x 1 cm) and operation on the harp strings |

A mallet with a rubber ball head and a thimble placed on one finger were used in conjunction, but alternatively, as percussion tools to gently strike a cork placed in-between the strings, whose sound was amplified by means of the contact microphones at the bottom of the strings. This creates a beautiful, bell-like, deep, low, resonant rumble.

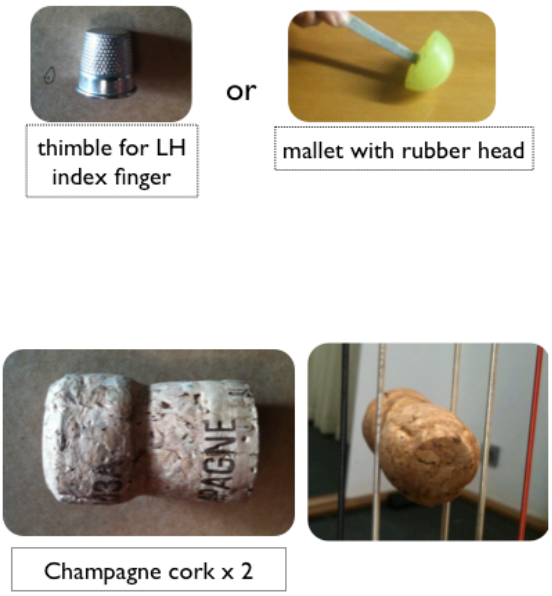


Figure 20 | Thimble, rubber-head mallet and cork used in conjunction as 'preparation' tools for the harp |

A guitar plectrum was used to scrap the amplified C string of the 7th octave, producing a nice noisy granular sound. This was further enriched by buzzing foil attached around the string and amplified with the contact microphones.[AV01] This started as a strong isolated performance gesture with the plectrum, and then evolved in later versions of the piece (including recorded versions), by means of layering, to generate a 'wall' of granular sound. Layering of these sounds was achieved by using different methods, such as a 'Looping Station' (a piece of analog equipment with a sampler) for live layering, and recording / playback computer software in studio versions of the piece (although not eventually carried out, I also contemplated for this particular purpose, the use of multiple simultaneous harpists). Timbral complexity was further enhanced by detuning different layers in the recorded versions of the piece; the different layers were detuned slightly higher or lower to each other to create a more complex and interesting sonic texture.[AV03, AV06, AV07]

I also experimented thoroughly with amplifying other common objects to explore their sound-making potential in order to combine with the harp sounds in performance. Objects such as cardboard boxes with attached elastic bands, bicycle wheels, glass, etc. were explored in depth. Using some of these prepared objects, I then created hybrid live versions of the piece for two or more performers; for

example, a version for harp, amplified bicycle wheels and cardboard boxes. These extra sounds generated an additional noise field, as well as providing harmonic and buzzing sounds matching and accentuating the output from the harp itself. [AV14a, AV03]

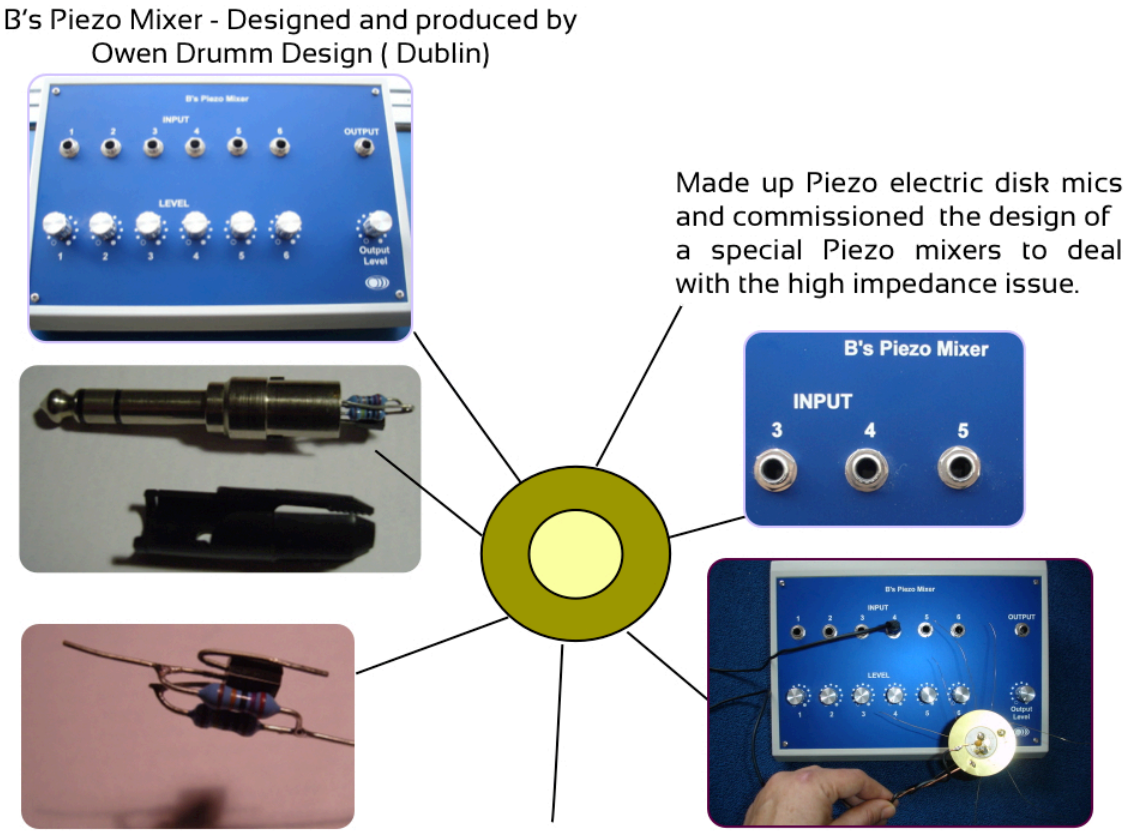


Figure 21 | Custom made Piezo mixer for up to six simultaneous contact mics - designed and produced by Owen Drumm Design. |

Figure 22 | Here I am performing with amplified box and amplified bicycle wheel and below the full performance setup - Het Nutshuis, The Hague [Photographs by Het Nutshuis] |

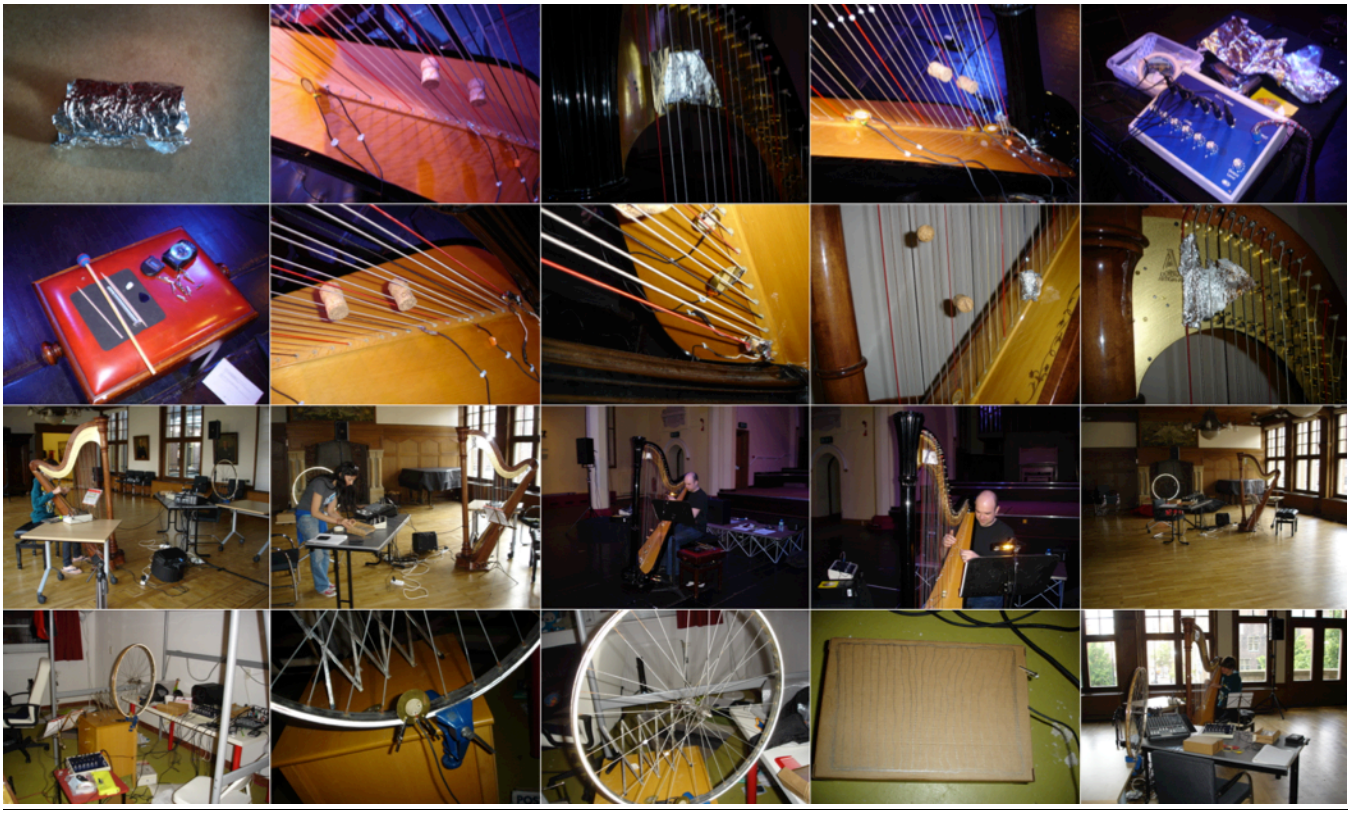


Figure 23 | Experimenting and testing with the multiple 'preparations' of the harp [Photographs by Barbara Ellison]|

3.3 RITUALISATION IN PERFORMANCE

One of the main features of my compositional work is the use of repetition, exaggeration, elaboration, and other forms of 'accentuation', to intensify and highlight patterns and phenomena that might seem apparently ordinary or indistinctive. This fundamental transformation of the 'normal' is at the core of my practice; and I believe that it has to do, at a very essential level, with aspects of ritualisation of performance[5].

The independent scholar Ellen Dissanayake's theories of ritual and ritualisation[6] in the context of art and culture have been inspirational for me, in terms of reflecting on my own use of ritualisation of action and process (Dissanayake 1992). She uses the term 'artification' to describe how an everyday normal action is 'artified' or 'made special' through the ritualisation process, and consequently transformed (Dissanayake 1992). This process of 'making special' or 'artification' refers to the creative process to 'make ordinary reality extraordinary' (Dissanayake 1992, p.49). She considers the arts as 'behaviors of artification'; creative things that people do to make ordinary events *extra*ordinary: repetition, regularity, stylisation, exaggeration, formalisation and various other kinds of elaborations. In my own process of sonic ritualisation I use equivalent fundamental structural features such as

repetition, exaggeration and elaboration of sounds, movements, etc., to intensify and to engage the attention of others.

Even though some of the performative actions on the instrument are more easily repeatable than others, in general I tried to fine-tune them to make it possible to automate and maintain a regularity of repetition carried out over extended durations. Executing actions that can be repeated and internalised with time, enables the performer (and the listener) to zoom in and 'get into' or absorb the gesture, so as to magnify and reveal all its micro-details over time. Doing this throws a perceptual spotlight, so to speak, on detailed aspects of the performative action, to reveal nuances that we normally would not notice. It is a process of intensification and elaboration; when the action is made special by ritualisation, it becomes artified, abstracted and thus transformed.

In addition to this process of ritualisation, I specified for this piece a range of extended performance durations (20-45 minutes to 5 hours). Through this combination of ritualisation and persistence I wanted to bring both performer and listener into an intensified trance-like state of complete immersion in the process. One of my main compositional aims is the creation of a situation whereby losing oneself in the action / movement / sound is facilitated, encouraged and made possible, as a natural result of the performative and listening processes. To immerse oneself in the simple gesture, to become completely absorbed in the resulting sounding patterns with their perceptual changes and deviations over time, is for me a major objective.

When a pattern is established and has also become steady, the performer is requested to attempt to perfectly 'loop' the pattern (by repeating his / her actions) as soon as it arises, in order to provide a stable ground (in the sense of the figure and ground perceptual situation). It should be as if the pattern has been recorded into a digital buffer and is stuck in 'replay' or loop mode. Establishing the stable ground looping pattern allows for the interpretive brain to playfully transform and mutate patterns perceptually, before any deliberate elaborating acoustic changes are made. In reality, of course, without using technological tools to do so, it is extremely difficult to make flawless repetitions (in the sense of being identical). However, it is precisely the attempt to do so that often makes it a very interesting process. The action type will of course have great influence over this aspect, as does the ability of the player to seamlessly iterate. A key component of this process is therefore repetition, which enables these simple interacting patterns to manifest perceptually into complex emergent phantom patterns. Through immersion in the repetitive process of action playing, the mind is freed up to tune into the subtle transformations of micro-shifting emergent patterns, which can suddenly appear and disappear in perception. This setup encourages the potential for accidental discovery in the sonic blotscape, providing 'a net to catch contingency'.

For the player in performance, if patterns emerge in perception and are heard as phantom artifacts, then he / she can reinforce these patterns and bring them clearly to the foreground through emphasis and elaboration. These pieces seek to achieve this through their exploration of the ritual process; by means of the use of looping structures and repetition they aim to help player and listener obtain states of immersion and trance through performance.

This is of course a feedback process, a system in which the interrelationships and interactions between instrument / object / action / space at different levels of perception give rise to the emergent result. The realisation of this piece will also change depending on the conditions and circumstances. The final resulting sonic image emerges from this network of relationships, from the constant perceptual alternation of this figure-and-ground bistable system. It is a process that is permeable to change, feedback and adaptation, depending on the player-environment-listener relationship.

3.4 STRUCTURE AND POSSIBLE VARIATIONS

The score of 'Harp Phantoms' functions as both as a documentation of the piece development process and as a functional structural map of performance instructions. It is divided into several scenes or movements, which can be performed in a set given order, with specified approximate durations for each action-based scene. In different performance situations, these durations can be easily adapted, depending on the overall time set in advance for performance (see figure 18).

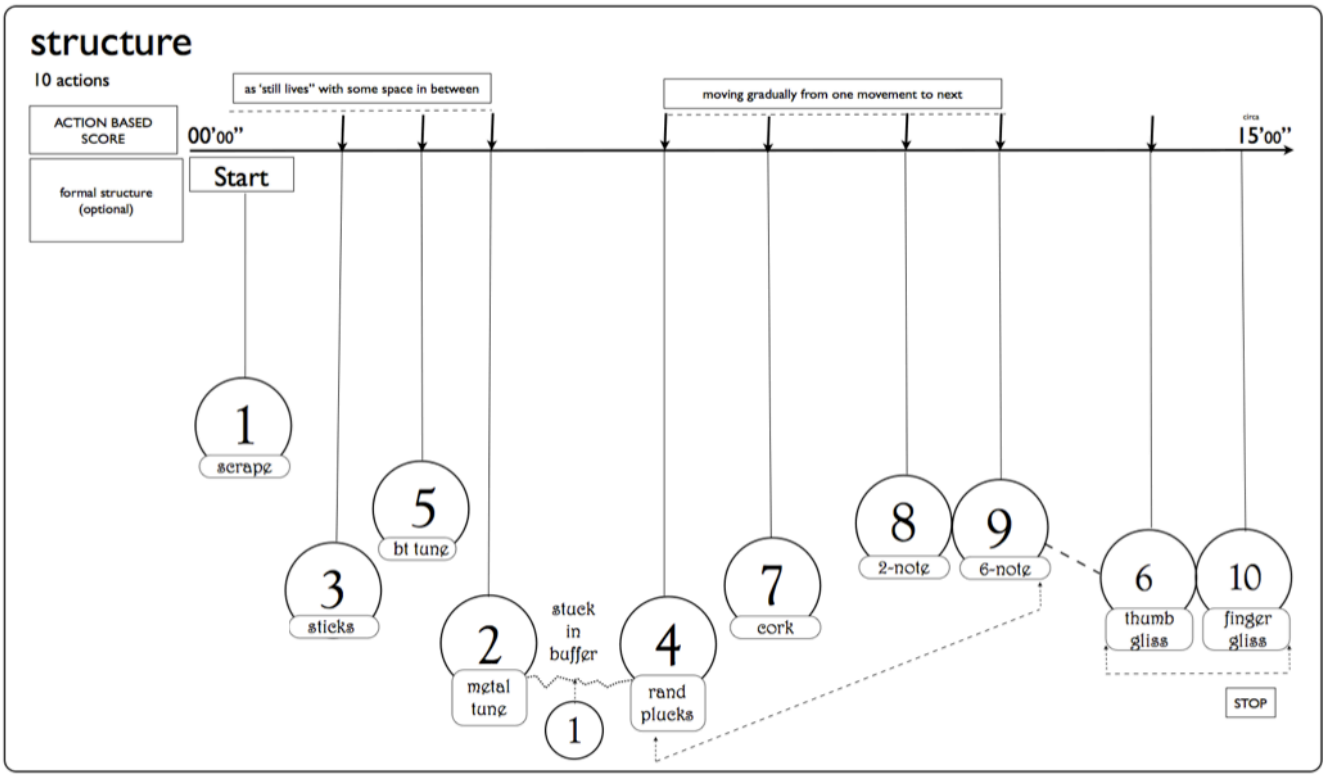


Figure 24 | Structural map along the timeline for 'Harp Phantoms' (part of the score) |

The durations of individual actions for each scene are never fixed but instead adaptable to each performance situation. I have experimented with many variations of internal formal structure of this performance. Performing just one action or, alternatively, a combination of a selection of actions can also be intensely minimal and effective. Together with the harpists, we realised various performances and selected one of the actions / scenes only to be played for 20 minutes, or on another occasion a selected duo of actions, or all actions spanned out over an extended duration of five hours.

As this project has developed over the last couple of years the most interesting and successful 'Harp Phantoms' performances for me so far have been reductions of the piece to one or two actions, combined together and extended in duration. Extended duration performances for me, in the case of this piece, imply an overall duration of a minimum of around one hour. This timeframe provides optimal conditions conducive for entering into liminal or heightened states of perception by inducing a state of intensified absorption. With extensive repetition, the brain and body do not need to spend energy focusing on new actions and so attentional resources are freed up to listen to potential phantoms patterns.

There are a number of approaches to performing this piece and all can be deconstructed, adapted and played with:

(1) 'Straight' performance of all action scenes in a set given order, with specified approximate durations for each scene. Overall durations of the combination of individual scenes is dependent upon the performance situation, which in turn depends upon the overall time allocated for performance.

(2) A selection / combination of actions and order allowing for a selection of any particular action, or any combination of any number of them.

3.5 INHERENT PATTERNS

Both the 'stream segregation theory' ((Bregman 1994, Handel 1989); see also next section and the glossary) and the 'figure-and-ground reversal theory' ((Lidwell & Holden 2003; Gombrich 1973; Woodfield 1996; Ellis & Koffka 1997); see also the glossary) have shed light for me in terms of explaining what is actually taking place, at a perceptual level, when working with ambiguous interlocking structures. Additionally, from another perspective, the research of Austrian musicologist Gerhard Kubik into the 'auditory streaming phenomenon' (Kubik 1962; see also the glossary) has served to provide much inspiration and insight into the subject from an ethnomusicological viewpoint.

Kubik first introduced the term 'inherent patterns' in 1962, whilst describing his seminal work on the composed illusory patterns that emerge from the Amadinda and Akadinda xylophone music from Uganda (Kubik 1962). Whilst taking Amadinda xylophone lessons in East Africa, and without knowledge of the experimental laboratory research into auditory streaming (Miller 1950; Heise & Miller 1951), Kubik stumbled across the streaming phenomenon independently himself in the field (Kubik 2010)[7]. Inherent patterns, as put forth by Kubik, can be defined as independent melodic-rhythmic phrases that only exist as an aural image and are not played as such by the performers. He described them as a *Gestalt*-psychological phenomenon caused by a certain structural arrangement of rapid passages with wide intervals (Kubik 1966; 2010a; 2010b).

It was a revelation for me the first time I heard a recording of Akadinda and Amadinda xylophone music from Uganda, as it is such an extreme realisation of an effect that I had myself being playing with and exploring with different instruments[8]. It is a truly impressive example of sonic phantom-producing polyphony induced by auditory streaming. For Kubik, there is no other culture in the world whereby composers have so successfully manipulated the human perception system with such expertise. Kubik describes how the court composers of Buganda had 'learned to play tricks on auditory perception' (Kubik 2000). They had composed pieces that exploited a particular characteristic of human auditory perception by employing these rapid interlocking cycles of pitches with certain structural arrangements and wide intervals to facilitate the production of sonic phantoms. Through these pieces composers revealed something about the nature of human auditory perception and

exploited this knowledge in their compositions (Kubik 2000). Moreover, Kubik notes that obtaining the resulting pattern *Gestalts* is indeed the objective of the process; they are not just mere incidental artifacts of the faulty human auditory perceptual apparatus: inherent patterns are 'what many African composers are after by passion':

> There is a psycho-acoustical fact which African composers particularly of instrumental music (xylophone, likembe, etc.) are delighted to take advantage of: that the human mind is inclined to join together form objects of similar or equal qualities and establish a "gestalt". In music the listener associates notes of equal colour or loudness and of equal or similar magnitude. If, further, notes of similar qualities are arranged in a definite rhythm of occurrence then association is enormously stimulated. This is what many African composers are after by passion (Kubik 2010a, p.71)

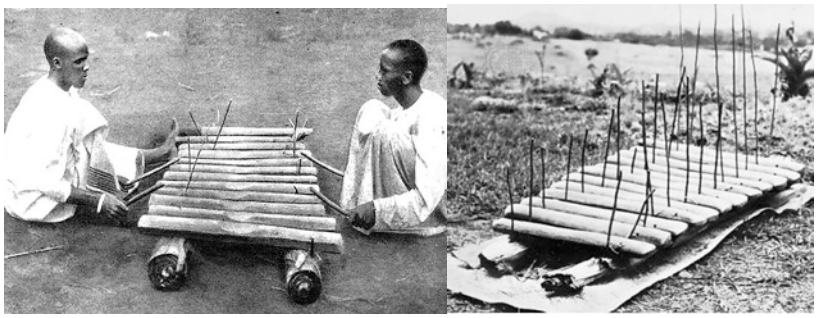


Figure 25| Amadinda instrument (Photographs by: Hillegeist /Kubik) | [AV105]

When referring to the xylophone music of the Amadinda, Kubik also highlighted the perceptual mismatch between the sensory input of the players and the resulting illusory sounding image:

> By applying the economical technique of interlocking performance parts, and through an irregular structuring of pitch sequences in disjunct intervals, composers learned to create auditory jigsaw puzzles that would oscillate in perception (Kubik 2010b, p.112).

Listeners perceive patterns that are not played as such by any of the players, but are instead results of the perceptual restructuring mechanisms of the brain. In this fashion, the sounding image of the music often differs quite dramatically from the notes that we can see being played. I had myself noticed such an outstanding mismatching in the Inuit *Katajjaq*, the vocal 'games' typically performed by two women in the Arctic (see chapter 5). These cases are blatant examples of 'what you hear is *not* what you see'; what you hear is in fact the result of a perceptual restructuring of the normal brain operation, trying to make sense of the input. This is a fundamental core aspect of my work with sonic phantoms and I somehow equate the compositional process to generate sonic phantoms with exploring the active nature of perception itself.

Interlocking patterns permeate my own compositions in various ways and help in contributing

to the multilayered polyphonic structure of the music. The essence of this kind of pattern construction, linking it to the classic figure-and-ground bistable visual images, is that the patterns themselves share common borders with common elements. This sharing of borders causes confusion for us, as we attempt to organise the incoming signals into coherent patterns, making perception ambiguous. In 'Harp Phantoms' the performer is able to generate a kind of indirect polyphony, though the creation of instrumental patterns, which split into subjective streams producing a contrast between a 'played' and a 'sounding' image. **[AV09, AV09a, AV09b]**

3.6 AUDITORY STREAMING

When we are listening, there are a number of acoustic dimensions that we use in perception, as cues to group together the components of sound textures (see Bregman 1990). Stream segregation theory has shown that whether we listen to our everyday sound environment or to music, we use many aspects of timbre to organise the musical surface into 'streams' (see e.g., Bregman & Rudnicky 1975; McAdams 1979; Bregman 1994). The well-known *Gestalt* laws of organisation largely guide the way we carry out such perceptual grouping. When sounds elements that are perceptually similar are grouped together they will tend to form streams, as coherent *Gestalts*, whereas sounds, which are perceptually dissimilar, under the same conditions will tend to perceptually separate[9].

In music, many different factors or parameters, acoustical and perceptual, influence the stream segregation processes and the relationships between horizontal (sequential) and vertical (simultaneous) modes of sonic organisation. In the case of my 'Harp Phantoms' pieces, pitch and amplitude similarities or differences have an obvious role to play in the auditory stream formation, but equally, timbral acoustic properties such as harmonic spectra, formants, attack and decay transients, due to the particular preparation of the instrument, as well as the repetitive nature of the material, will also affect the formation of auditory streams. In these pieces there is a constant changing formation of auditory streams and sub-streams, due to shifting shared borders between component patterns and subtle changes in timbral organisation.

A sound-producing action is repeated and built up into a stable looping ground pattern. After some time, factors like subtle finger playing pressure changes can induce the once coherent and stable auditory stream (i.e., sonic results of action) to split into sub-streams. This splitting of a coherent stream into sub-streams can have a dramatic perceptual effect on the material, such as an alteration of the pattern rhythms or a sudden generation of independent noisy artifacts. Such noisy artifacts from the looping streaming structures are predominantly what causes the patterns we hear as sonic phantoms. Noisy timbral elements generated from activating the prepared strings of the harp combine and

recombine with other sound elements to produce new timbral streams, which are both reinforced by the player and exaggerated with the amplification of the piezo-electric microphones.

Table 1 | Summary of key conditions for generating sonic phantoms through the use of interlocking structures (compiled and structured from different sources: (Wegner 1993; Cohen et al. 2003; Kubik 2010a; Kubik 2010b; Jordania 2006; Grauer 2011) |

Fast Speeds	Fast to 'breakneck' speeds work best. There is a speed threshold upon which we hear multiple split streams, and another when we hear one coherent auditory image.
Disjunct intervals	This will ensure that we perceptually group tones that are in closest proximity to each other and this will force the sequence into separate streams.
Interval range	For effective streaming, the combined range of intervals will usually not exceed an octave.
Regularity	Pattern cycles should be regular, but played accents on the patterns can be irregular, to bring out hidden structure latent.
Cyclic composition	Length of cycle can be varied. Longer cycles perhaps have more potential to generate more results, but smaller cycles can also work their magic if properly structured.
Multiples	Using multiple layers / instruments with identical timbres (instruments, sound sources, materials, etc.) when constructing interlocking patterns.

With many of the harp patterns, if they are performed or replayed at slower speeds, we experience them as if they belong together to one group or *Gestalt*. They form a kind of coherent melody. At faster rates of play, there is a point where this coherent pattern 'stream' appears to splinter into multiple independent sub-patterns. Instead of hearing one stream of sound we now hear a number of smaller individual streams. Due to the repetition of the material and the faster speeds, our perceptual apparatus spontaneously reassesses the input; we reorganise what we hear into new streams based on what our perception considers to be meaningful.

In general, the streaming of sounds will come into effect when rates of play reach around eight or more sounds per second, although this threshold will vary, depending on the type of material in

question. At super speeds (15 and up /second), streaming processes break down and we can no longer process these independent streams anymore as separate distinct sound patterns, but instead hear the groups as granular 'texture', a return to the coherent auditory image. As part of this dynamic process, the *Gestalt* laws of similarity and proximity influence our perceptual grouping of sounds into streams such that sounds closest to each other in pitch or timbre will tend to stick together. As one would expect, the pitch distance between component sounds, i.e. the interval, will have an effect upon the pitch and the timbral streaming of sounds.

My own experimentation suggests that when working with interlocking patterns the most effective interval range –to use for instrumental sound patterns in performance– is between sounds larger than a major second but just smaller then an octave. When conditions of speed and regularity are met, this will force an entire *Gestalt* sequence to split into streams. These sub-streams can be clearly heard as prominent phantom patterns that seem to emerge magically from the interconnections between the sound elements.

In the scene 8 of 'Harp Phantoms' the player uses an alternation of the thumb and first finger of each hand, successively looping each pattern to contribute to the overall 'whole' pattern.**[AV08, AV08a/b]** In the scenes 6, 7, 9 and10 I have divided the composed patterns, to be played alternating between both hands.**[AV06, AV07, AV09, AV10]** The alternating hands play the patterns, even and regular, equally spaced in time; despite the regularity, however, the interleaving of the two parts creates high and low perceptual streams that give rise to surprisingly irregular rhythms. The combined sequence is too fast for the ear to follow note by note and so our perceptual circuitry has to regroup the material to make the best fit, forming several different melodic and rhythmic patterns. The sonic phantoms that we hear are not played as such by the player but are instead a result of our pattern-forming perceptual mechanisms that attempt to group the incoming sounds into the most 'meaningful' patterns.

The splitting of sounds into independent streams provides potential for sonic phantoms to appear and disappear. Some of these patterns can serve to stimulate suggestions of words or phrases or suggestion of other sonic forms. Most of all, the oscillating patterns function as sonic blotscapes that suggest and inspire ideas for development of the patterns and the forms they might take. For the form-creating mind, intense listening of the repeating blotscape patterns will eventually animate them, as if they were 'speaking out' or 'musicalising' themselves[10] (one examples of a suggested verbal 'meaningful' phrase I can hear in sections of the 'Harp Phantoms' pieces is: 'I hit the wall'.**[AV13]**

A potent side effect of the streaming process is the possibility to generate irregular rhythmic and temporal distortion from regular patterned material. When tempo conditions are favorable for streaming, then individual isolated elements will restructure themselves from the context of their host

patterns to form new perceptual groupings. Consequently, the rhythmic structure of the pattern appears to have changed when in actual fact there has been no acoustic change of rhythmic structure.

The streaming effect causes a curious distortion of the temporal relationships between the elements and thus our temporal experience of the music. I find this really intriguing; our perceptions of melodic and rhythmic patterns can be entirely distorted or transformed upon making a certain change that affects their perceptual grouping. The notes of an interlocking pattern may be organised in a particular identifiable sequence in time –like beads in a necklace– but at fast rates, due to the interlocked structure, we perceptually group the elements that seem to make the best fit together. In scene 9 of 'Harp phantoms' two interleaving, isochronous, three-note patterns are played reaching the threshold speed, to give rise to new perceptual groupings.[AV09, AV09a/b, AV10] The former regular sequence transforms into multiple high and low streams based on pitch proximity and interpreted as irregular rhythms. What was initially an integrated rhythmic pattern constrained within one coherent stream seems to spontaneously split between two streams, and so experienced as a change in rhythm. The regular rhythmic patterns are transformed into irregular ones due to the streaming process and the perceptual temporal order of the sequence of sounds is difficult to determine due to the streaming ambiguity.

These spontaneous perceptual alterations are essentially what give rise to the sonic phantoms. In all the phantom pieces, in different ways, I manipulate the timbral stream-forming process to alter pitch and temporal patterns and so bring into audible focus new auditory streams, –the sonic phantoms– that were previously embedded and undetectable in the main texture.

3.7 SONIC FIGURE AND GROUND

Auditory streaming is essentially the analog in the auditory domain of the figure-and-ground reversal images. Like the visual bistable images, interlocking sonic structures that produce the streaming phenomenon also share common borders. In the visual bistable images, in terms of figure-and-ground relationships, one can either attend to the figure or the ground, but not both at the same time. Similarly, when presented with an equivalent bistable auditory streaming situation, listeners can only play attention to one sonic stream at a time. This logic follows the *Gestalt* rule of 'belongingness' and is also described as 'mutual exclusion'. When a sound is incorporated into one stream, in general it cannot simultaneously become part of another auditory stream (Bregman & Rudnicky 1975). Regarding auditory streams, the stream that is brought to attention in the foreground would be the 'figure' and the stream that we are not attending to would be the 'ground'. It is the blurring of the boundaries, of the foreground and background relationships that make it bistable. If two patterns with similar timbral structures are interlocked and layered, as in the case of simultaneous harp sounding patterns, then both can alternatively be perceived as figure and ground at different moments.

Creating bistable systems with their ambiguous patterns, which can spontaneously alternate between figure and ground, not only offers to the listener the interest of changing perspectives, but also provides the potential for generating sonic phantoms. In general, the more bistable the system is, the more ambiguous, unstable and unpredictable the figure-and-ground relationships will be. Ambiguous sonic scenes require a more active effort from the perceptual system to decode. We need to focus with intent in order to detect patterns before they emerge in our awareness. It is my feeling that this effort may contribute to the aesthetic pleasure gained from the enjoyment of listening and ascertaining the ambiguity in a musical scene; those moments when clear patterns seem to suddenly reveal themselves.

In my phantom pieces, I work to compose many ambiguous, 'open' auditory images; sonic blotscapes to be enjoyed, without a central focus *per se* and with the potential to be listened to at many different levels and from many alternating perspectives. Spontaneous patterns seem to randomly appear into awareness and then disappear into the sonic ground tapestry, perhaps never to reappear again. This capacity for different patterns to spontaneously rise to the foreground upon repeated listenings contributes to provide a perceptually unstable, and thus ambiguous, listening experience. The fading in and out of patterns in perception constitutes the liminal 'in-betweenness' of the musical relationships that I am keen to create.

In general, subtle changes are better detected within more stable and relatively unchanging states. When everything is in a constant state of change it is difficult to detect any distinct forms. A

continuity of ground pattern established over time provides a stable constant background from which phantom patterns can emerge from and dissolve into awareness. For subtle timbral changes to be perceived and 'foregrounded', most other parameters should remain constant. In general, this means that changes made to patterns and their configurations should be steady and gradual. Making minute changes in a parameter at a time whilst keeping all others constant emphasises and highlights the subtle timbral streaming effects and transformations resulting from that particular change. Changing too many factors simultaneously destabilises the solid background, which is necessary for playing with the figure-and-ground relationships. However, to produce multiple perceptual patterns it is interesting to have multiple ground auditory images, which can change perceptually upon repeat listenings. When the most apparent musical parameters are kept constant this creates a leveled playing field for all potential auditory streams; all sorts of perceptual auditory images have equal potential for being noticed by different listeners. Each of these patterns has an equal chance of being figure or ground, which means more potential for varied ambiguous perceptions.

3.8 LISTENING MODES AND PERCEPTUAL COMPETITION

The process of listening itself at its different levels will influence the perceptual experience of ambiguous musical material. In Auditory Scene Analysis (the perceptual mechanisms of our hearing that generate meaning and sense out of the constant audio input; see the glossary), 'primitive' modes of listening are used to detect and extract patterns, and are understood to be pre-attentive or pre-cognitive. In a more cognitive listening level, like that of aesthetic listening, we adopt schema-based modes to actively focus and zoom into sound patterns and their details. With these types of modes, we internalise patterns and make mental schemas out of them. When listening to repetitive sound patterns our listening modes shift between primitive and schema-based segregation processes. Sometimes it will be the primitive stream segregation processes that will guide and influence our perception, and sometimes we use our experience and repository of previously saved sonic schemas to consciously attend to certain groupings.

The point is that the level of listening, which activates the various streaming processes, will affect and influence how we perceive specific patterns, how we group sounds, and whether we attend to them or hear them as motifs, melodies, textures, etc. The attentional focus of the listener will often contribute to *how* the resulting streams are determined: by 'pitch streaming', by 'timbral streaming', by 'amplitude streaming', etc. With ambiguous patterns, for example, pitch can compete for streaming with spatial location (e.g., panning considerations, musician placement). We may perceptually group the pattern sounds by how close the pitches seem to be to one another as opposed to grouping them by

spatial location. In such a case, pitch proximity is dominant over spatial separation and those patterns grouped by pitch proximity / similarity will be foreground in our attention.

Deliberately composing this kind of competition between the perceptual grouping cues can encourage the streaming effect and so contribute to the ambiguous outcome of the musical scene. Many of the sonic phantom streams that emerge from the 'Harp Phantoms' interlocking patterns emerge as a result of competition between grouping cues such as pitch proximity or timbral similarity between sounds. The *Gestalt* laws of proximity and similarity (Bregman 1994; Handel 1989; Kohler 1970; Ellis & Koffka 1997) reveal why there is such ambiguity as to whether we perceptually segregate the acoustic scene by pitch or timbre.

3.9 ACCENTUATION OF HARP PHANTOMS

In practice, throughout creating my compositions, I have spent a great deal of time playing with the accentuation or highlighting of certain streams and patterns, in order to deliberately bring them in and out of focus. I use accentuation techniques by manipulating certain parameters of a pattern to enhance and exaggerate with the purpose of bringing them fleetingly to the foreground. Any number of different patterns can be foregrounded at different times. Composing the emergence of alternate embedded patterns through accentuation is, in effect, playing directly and intentionally with the sonic phantoms.

The figure-and-ground relationships in a piece are unstable until the momentary point of stability when hidden phantom patterns are brought clearly to the foreground, amplified and essentially made less ambiguous through different means of highlighting. When sonic phantoms are reinforced and brought into the spotlight through various means of coincident reinforcement or accentuation techniques, this works to draw attention to the unstable nature of the musical texture. With this form of illumination, I can bring embedded patterns, previously hidden to perception, into focus. The purpose of this is to draw attention to fleeting patterns and to play with the overall level of ambiguity at any given time. Through subtle alterations of dynamics, spatialisation, frequency equalization and other parameters, I can enforce and reinforce the segregation of the phantom pattern streams.

For example, if the amplitude of a couple of notes within a certain pattern being played in the harp is minimally increased (by means of increased plucking pressure on a string, for instance), whilst keeping the rhythm and pitch pattern constant, then the influence of this new dynamic change will force the pattern to be 'foregrounded' from its base texture.[AV08,AV09a] When the base pattern is played on the harp over the threshold speed, these individual amplified components will segregate

from the rest of the texture. If highlighted, these sub-patterns will be heard as independent distinct patterns; but if the highlighting is ceased, then the notes will perceptually reintegrate into the context of the basic pattern. In other parts, the extreme high pitch of the plucked sound, which is repeated at random intervals in the pattern, helps to encourage a clear segregation of the grouping of these high components of the sound.[AV09]

Occasionally, the repetition of a single component of the harp sound will clearly surface as an individual figure stream, which appears to have almost no temporal relationship to the interwoven fabric created by the underlying sonic texture. In a section of scene 9 of 'Harp Phantoms'[AV09] the consecutive notes G and A may be heard as a continuously alternating pattern. The close pitch proximity of these note patterns is responsible for the notes to perceptually group together and makes it possible to hear them as a single coherent stream. The high texture is clearly heard as an independent stream above the remaining parts, which are interwoven in a tight configuration.

Another powerful strategy to bring into focus the phantom patterns, which I have used in 'Harp Phantoms', is reinforcement by the setting up of coincidental events and layers. For example, in 'Harp Phantoms with Organ' (a version I created for a Wave Field Synthesis sound system[AV14]), I introduce a series of long sustained organ sounds, to coincide with the six-note harp pattern at the point when it has been established. Due to the simultaneous polyphony of the harp and organ layers, the sonic phantoms may not be heard until they are brought into focus. This use of coincidental material can either aid or hinder the ability to clearly isolate the distinct sub-patterns depending on the context. Sometimes such simultaneous coincidental processes can act to create opposing directional forces. The sonic patterns created by the harp, with increased, non-linear internal activity, run parallel to a gradual lengthening pattern composed of a series of linear organ sustained notes. The linear process of the organ material drives a sense of forward movement, which contrasts and competes with the motionlessness of the harp patterns. A listener can move between attending to the linear process of the organ, in 'horizontal' mode, and the more 'vertical', internally moving, non-linear patterns of the harp.

By illuminating a pattern that is embedded within the pre-existing texture, the effect can be also one of stasis rather than of forward motion. Employing strong vertical relationships offers the potential to orient the mind to seek for more subtle details in the sonic tapestry, countering the effect of horizontal linear flow of time. Repetitive patterns with a tight interlocking of parts can counteract linear movement, which could result from timbral change or dynamic variation. There are linear and non-linear forces at work. Through trial and error, playing with the dynamics of these different temporal forces, I try to achieve an interesting balance between patterns that are perceptually

ambiguous with those that are clear and distinct. It is another way of ensuring a stable ground from which the phantoms can mysteriously appear.

3.10 A SECOND LIFE OF HARP PHANTOMS IN THE STUDIO

After the initial workshopping period, I devised and developed a number of techniques and processes, which were then documented and scored for live performance. Some time later I decided to make studio recordings of these actions and techniques, whilst they were fresh for me and still in the mind of the player. In the recording studio we made numerous recordings with different microphone setups of the diverse actions and patterns over the course of the experimentation period. I have subsequently used this recorded material as a repository for making many new pieces, composed of combinations of layers of patterns with synchronous and asynchronous organisations, as well as exploring many further options for future live performances. The pieces 'Harp Phantoms 03, 06, 07, 09'**[AV03, AV06, AV07, AV09]** have been composed in this manner using these techniques as a way to increase the complexity of the initial material and to explore a more intricate polyphony that is possible with digital audio tools.

The studio pieces are composed using processes of layering and stratification between simultaneous layers of sound. They are constructed from layered sonic structures of multiple simple component patterns. Layers are stacked and offset against each other to create densely detailed textures. The repetition of the layers and their offsets create a vertical organisation where symmetry and alignment of layers affect the complexity of the resulting overall audible pattern.

Typically, I carried out this studio work in two consecutive stages. The first one involves setting up two or more patterns to play together in synchrony, aligned and panned to center position. To establish this as a stable ground pattern is the first goal and requires enough exposure for certain duration of time, which is dependent on the length of the pattern itself. In the second stage, once these ground patterns are stable enough to be perceptually internalised, subtle micro-shifts of a second pattern can be made; layers can be shifted or nudged to the degree of a few frames of a second and even higher resolution (smaller units of time) in digital environments, which allows for these micro-shifts to take place.

A prototypical example of this two-stage process would start with an action or pattern 'A' composed and recorded in the studio, and repeated continuously in one audio track (A-t1). This would be the ground stable pattern. An identical copy of this pattern is made digitally and then played in unison with the original on a second track (A-t2). A-t2 is nudged in increments of samples by hand as A-t1 loops continuously and uniformly. The process of offsetting track 2 against track 1 by hand is

then actually recorded in real time through a digital audio workstation package. The first incremental nudgings of the phased second layer A-t2 results in slow and subtle changes of resonance and timbre. A point is eventually reached whereby we hear what appear to be sudden and rather unexpected shifts in rhythmic activity. Regardless of the fact that these incremental moves have been consistently gradual, quite suddenly there appears to be spontaneous moments of instability and irregularity. As the patterns continue to repeat and phase against each other, these irregular 'in-between' moments eventually gather stability again.

These unstable transition liminal zones during this 'nudging process' are due to perceptual regrouping processes (auditory streaming). This fragmentation stage feels chaotic, before eventually revealing a new stable and coherent order. New patterns are then established, and then again begin to fragment with the phased asynchronous shifting of the cycles. The experience of these changing transitions from order to disorder promotes the appearance of sonic phantoms, sometimes gradually, sometimes suddenly. Sonic phantoms appear and disappear and our perceptual mechanism is forced to regroup each time to make the best sense of the auditory ambiguity, guided by the 'primitive' and schematic stream segregation processes to detect new patterns and configurations.

4 *PHANTASMA MATERIALIS |* The Realm of the Object

COMPOSITIONAL PROJECT: 'DRAWING PHANTOMS'

4.1 INITIAL MATERIAL EXPLORATIONS

In this chapter I discuss a body of work developed over the course of five years, collectively entitled 'Drawing phantoms', to use as the framework to discuss characteristic aspects of my compositional practice which relate to ideas of induction of sonic phantoms in connection with trance induction and the ritual process.

There have been several stages in the development of this project with a cluster of performances at each stage, which have been documented. These pieces essentially explore the production of perceptual sonic phantoms through the ritualisation of a limited set of actions. They play with ritual form, to varying different degrees, and give rise to phantasmatic sonic structures, which emerge through a hypnotic repetitious exploration of a simple sound-producing action.

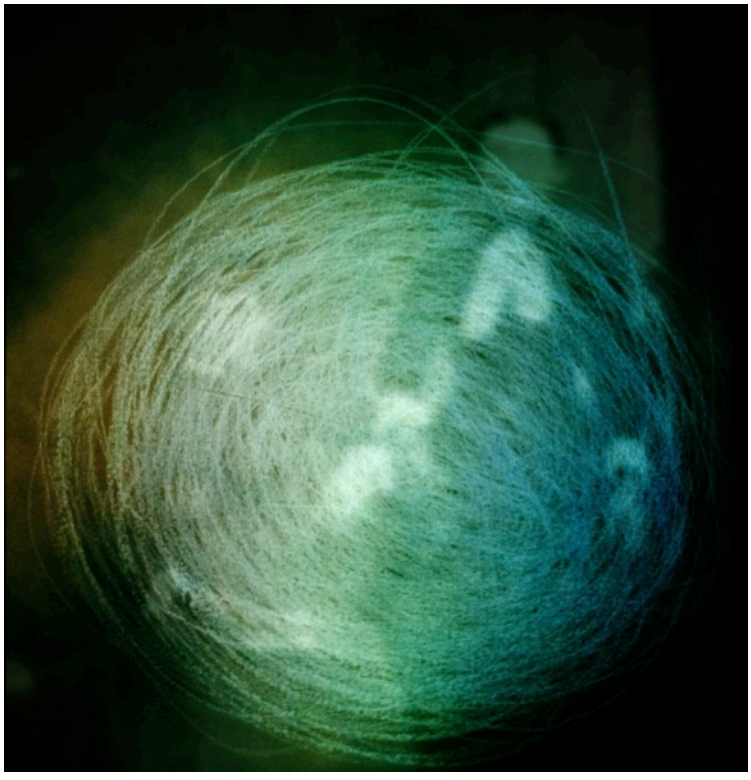


Figure 26 |Image of the poster I made for the live performance of 'Drawing Phantoms'|

To induce the phantasmatic, the pieces in the collection of 'Drawing Phantoms' essentially involve using drawing tools to mark and transform circular trajectories on amplified surfaces, which lead to the generation of phantom voice-like sounds. These voice-like sounds are reminiscent of effects experienced when listening to EVP recordings ('Electronic Voice Phenomena'; a field of paranormal audio research described in detail below). This strange audio-psychological effect is due to the slippery shape-shifting nature of the heard sonic image by the brain coupled with the trance-inducing effect of the repetitive action. The act of drawing abstract trajectories could be described in a literal sense as being a 'phono-graphic' performance: the drawing of sound, which I use to create a particular kind of trance-inducing, audio-psychological experience.

Besides its psychological effects, this systematic drawing activity is also quite a physical process, in that it might require considerable stamina when performed over extended durations of time. I have occasionally described my process as being one of 'drawing EVP', by reference to the classic phenomenon of 'Electronic Voice Phenomena'; I will elaborate later, however, on why it would be much more fitting to describe it –by comparison– as 'OVP', or 'Object Voice Phenomena', which is my proposed term for what I try to reveal as a much wider phantasmatic phenomenon than the purely 'electronic'.

Essentially, this is a project centered on exploiting the potential of our brain to 'hear' form in random structures. It is therefore an exploration of auditory apophenia. The mechanism of 'projection' plays an important role in the hearing of voices, as multiple interpretations of the ambiguous material are possible.

I can trace the inspiration for my drawing pieces to a clear starting point at the beginning of this research project some years ago when I first began to explore the use of mechanical repetition for the purposes of 'exciting' objects to create sonic looping structures. On one occasion I found a set of square concrete blocks with their own charming inherent resonances and began to use them as sounding boards. I found myself completely entranced by the sound as I etched noisy granular circles and infinity symbols continuously on the surface, using another small chipped piece of stone. The mechanically repetitive drawing process, and its resulting raw and noisy granular sounds, were hypnotic to my ears. I then experimented amplifying the blocks with contact microphones to reinforce and magnify the more subtle sound patterns produced. I was really amazed at the range and variety of timbral sonic possibilities that arose from such an apparently limited starting material.[AV15] Some of these initial explorations were carried out with several other performers, and eventually manifested as a live performance with several collaborators, that took place in Rotterdam in 2008.

Figure 27 |Explorations with amplified concrete blocks; five set-ups, each performer with two blocks. Live performance at 'Het Gemaal' space in Rotterdam (2008) [Photographs by Marielle Verdijk] [AV15]

This was initially a very intuitive and simple playful process, from which all kinds of rich and complex sonic phantoms were generated over time. This sparked my interest in the generation of sonic phantoms from the repetition of simple processes with everyday materials. Over time I have explored how such simple varied actions and gestures upon all kinds of materials can be ritualised and exploited for their sonic phantom generation potential.

4.2 'THE DRAWING ROOM'

'The Drawing Room' was the primogenial phase of the 'Drawing Phantoms' project and was realised as a performative art installation in the main hall of an old school, now a performance space called Stella Theatre, for the Zinder Festival in The Hague in May 2012. I created a performative installation, which consisted of a set-up using the existent old wooden tables in a former school classroom as

resonant surface structures, amplified with attached piezo-electric contact microphones. These tables were used as drawing surfaces for an intimate ritual, a daily performance of sonic drawings for both children and adults as players (four to six participants at a time), sonically projected through a quadraphonic sound system. The drawing ritual focus was to use the hypnotic power of repetitive drawing shapes in order to bring about a semi trance-like state. The shapes selected were thus intentionally simple and naturally allowing repetition, regularity and smooth transitions between them: circles, ovals and infinity signs. Upon completion of the ritual performance, the drawing trace of this process leaves behind beautiful and intriguing colourful abstract trajectories.

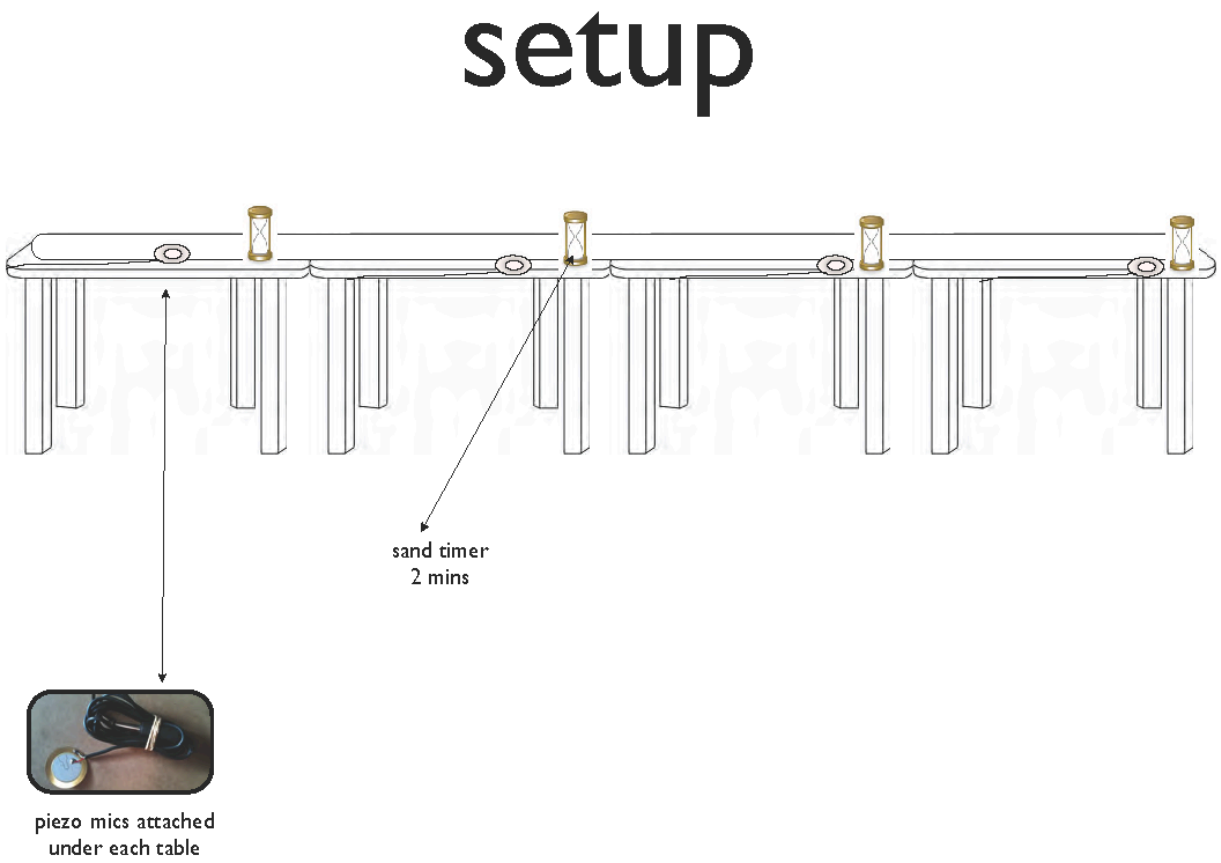


Figure 28 | Set-up scheme for the performative installation 'The Drawing Room' (The Hague, 2012). School wooden tables, piezo-electric contact microphones and sand timers |

Figure 29 | 'The Drawing room': space, set-up, children and adult performers, drawing trace results of the performances. Stella Theatre (The Hague, 2012) [Photographs by Barbara Ellison] |

I was fortunate to have three weeks in advance of the festival premiere to set-up, test and prepare the installation in the space, which was originally a children's classroom in an old school building (now a theatre space). I took this opportunity to experiment in detail with the installation set-up and to workshop the piece with members of the 'Trickster' artist collective (a Rotterdam-based performance collective, of which I am a member) as well as other interested volunteers. This exceptional amount of time gave me the opportunity to explore, experiment and also record the process. It was a period devoted to testing out various options and making key compositional decisions on the new ideas.

As is the case with other scores of mine, the score of 'The Drawing Room' serves as documentation of the project as well as a set of instructions for its set-up and realisation. I used four tables, eight piezoelectric microphones, four loudspeakers and one subwoofer, mixing console, rolls of recycled paper, metal clips and an array of drawing tools. I worked with rough grain recycled paper rolls that were one-meter wide, covering the entire surface of table. Additionally, I used old-fashioned –but very clear and efficient– sand timers for necessary measurements of time periods for the performers (described in more detail below).

Figure 30| Sand timer, wax crayons, paper and metal clips for 'The Drawing Room' [Photograph by Barbara Ellison]|

During the festival period, daily performances took place four times a week (twice each day). The weekly performances were specially focused on school children, while the weekend performances were open for all members of the public.

The room was prepared and emptied of all objects and furniture, except for the performance tables and a minimal amount of chairs for the audience. The ritual began before the participants entered the space. Instructions were given to remove shoes and to enter the space in silence (I had assistants to take care of this part and to guide each group). Each performance group comprised of twelve players, divided into four groups of three. Each group was given a colour code, which assigned that group to one of the four performance tables. I designed drawing aprons with the specific colours, which were made specifically for the event and worn by the respective players.

In silence, and guided by me, each participant was invited, one by one, to put on their apron and stand behind a table. When the participants were ready, I explained and demonstrated the process (without amplification, so as not to spoil the sonic surprise) and careful but simple instructions were given to reinforce the instructions in the score. The participants had already seen the instruction page of the score (copies of which were colour-printed in large sheets on the wall) in advance whilst waiting to enter the space. Lights were dimmed and silent attentional focus was directed to the blank paper of the four tables. Upon a cue, the sand timers were turned and the drawing ritual began. Sand timers were used as a strategy for timing the drawing process and to indicate change, without distracting the participant.

The piece was set-up and composed to facilitate a high level of focus and concentration, which engaged visual, aural and somatic faculties. It is important to keep in mind that the amplification through contact microphones of several simultaneous repetitive actions of this kind gave rise to intricate, dense, complex and variegated sonic textures in the space; in most instances, with a mesmerising effect. As I hoped, the ritual experience of collective drawing and listening was very powerful for both adults and children alike. Some of the participants reported that in this atmosphere of calm and concentration, the ritual drawing of the sounding shapes takes on a magical quality, which makes for a powerful experience. One particular participant spoke of her experience of each shape being a magical symbol, which slowly released its power over the drawing period. These were public performances and the socio-cognitive context of being observed by public members in complete quiet and concentration also contributed to a sense of expectation in the sharing of magical experience.

There is a sense of expectation, of mystery and ritual, with the participants aware in advance that deep absorbed and trance-like feelings may be experienced after some time. This expectation led to extreme concentration, seriousness (in the best possible sense of the term) and impressive

commitment from the participants during the drawing process. Many of them described sensations of 'entering into another world', of feeling 'entranced' and 'spellbound' in the process. Feelings reported in general were of the kind of deep meditation, trance, relaxation, calm, feeling energised, and –most significantly, with no previous admonition– of hearing 'voices' coming from the noise textures produced by the drawing action. With added suggestion that it was a possibility, 'voices', 'melodies' and 'rhythms' (different from the apparent ones produced by the hand motions) were unanimously heard from the granular sounds of the collective drawings. Playing with the suggestion of the drawn symbols being magical served to function to induce an excitement of the apophenic imagination. There was intense focus and concentration to work these 'magic spells' with the drawn voice-producing symbols. The participants reinforced each other as they collectively moved in and out of synchrony in their drawing movements. Many also spoke of the sensation of uncontrollable entraining (they used terms like 'syncing up') to the drawing speeds of the drawing participant beside them.[AV16]

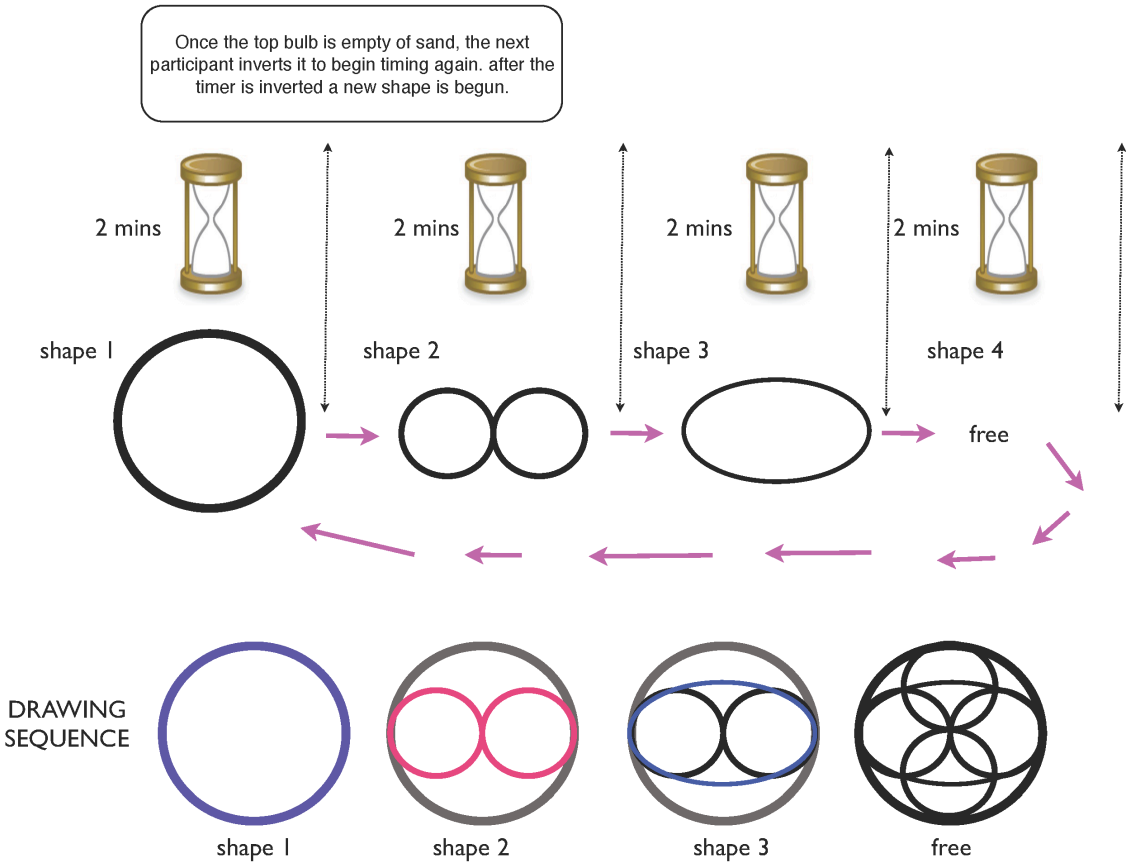


Figure 31| Instruction page of the score of 'The Drawing Room' with indication of the performance sequence |

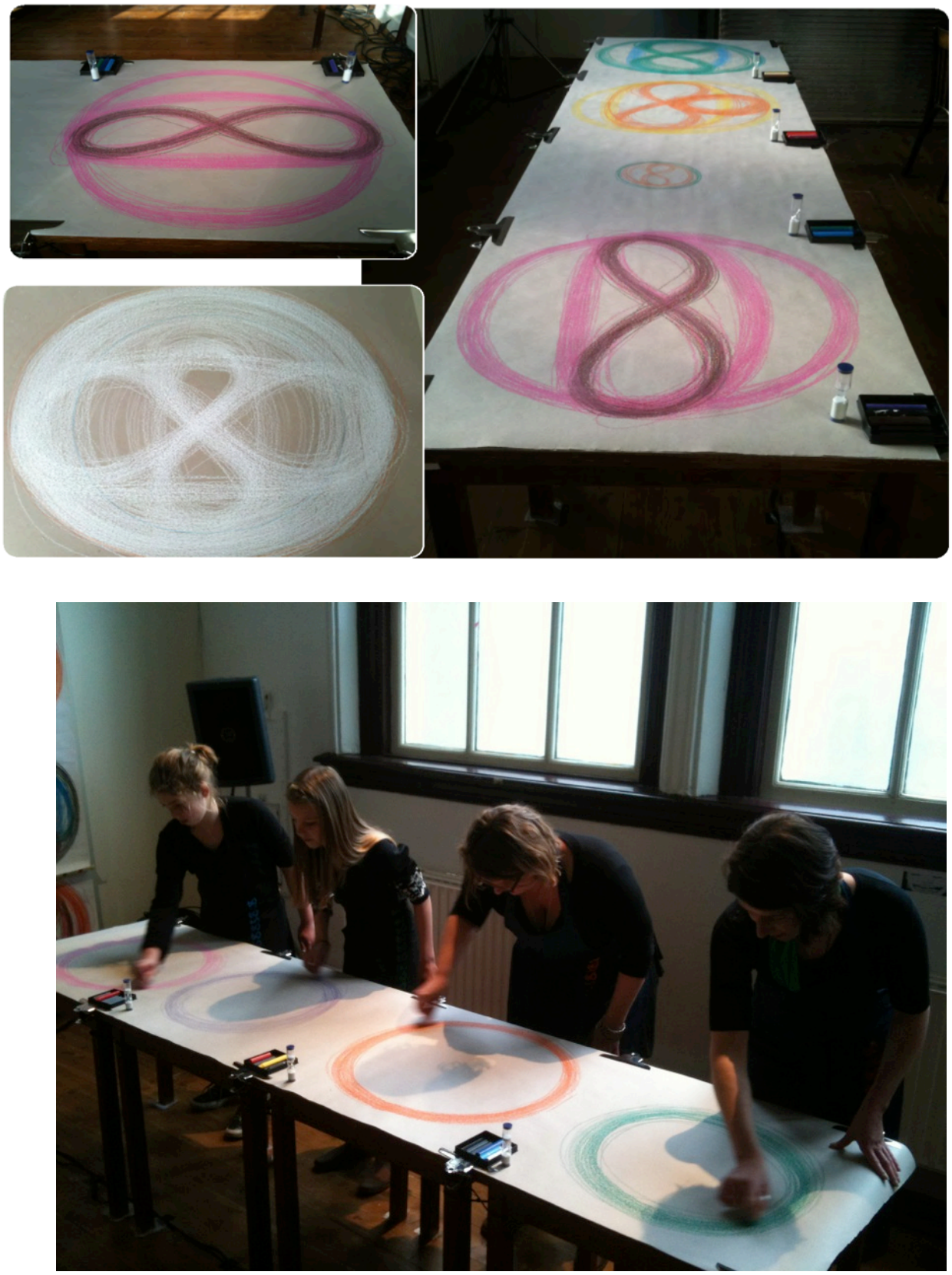


Figure 32| 'The Drawing Room'. Prototypical ‘traces’ of the performance and one participants’ group in action [Photograph by Barbara Ellison] |

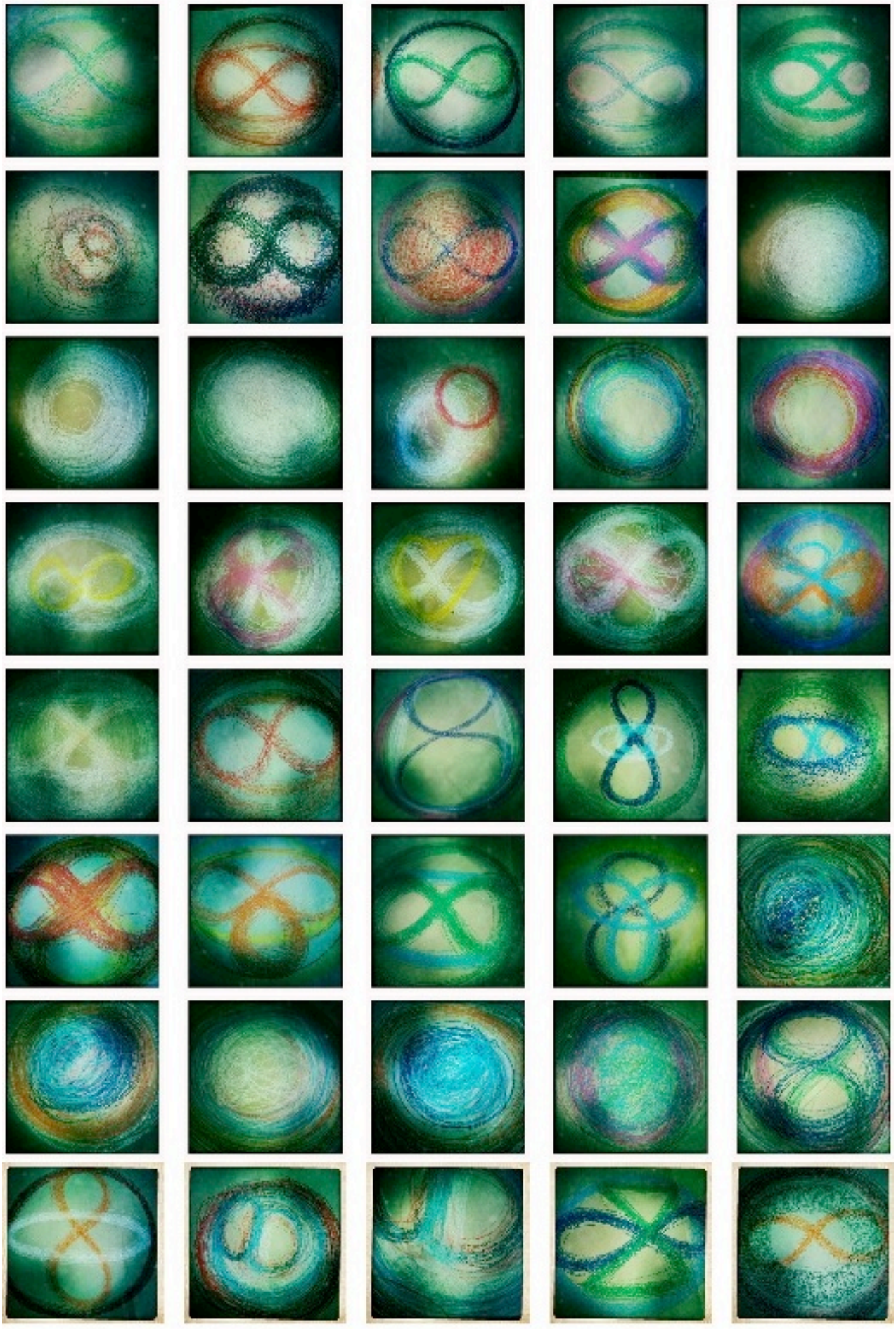


Figure 33 A selection of final 'traces' of the drawing process from 'The Drawing Room'

4.3 TRANSCENDENT 'BOUNDARY LOSS'

In 'Drawing Phantoms', as it also happened in 'Harp Phantoms', the repetition and the ritualistation of the sound-producing action itself plays a major part towards leading to feelings of trance-like experiences. Repetition in this context is naturally a key strategy that I use to induce states of deep absorption in both the listening and the performing process. The powerful effect of enacting repeated movements in, for example, dance, sport or ritualised movements like marching in drill is widely known and deliberately used for different purposes, as brilliantly described and analysed in great detail by William McNeill in his splendid book 'Keeping Together in Time' (McNeill 1995), on the phenomenon of 'moving together' by repeated and coordinated movements throughout human history.

In accordance with the observations of McNeill and others (see Bücher 1897; McNeill 1995; Gioia 2006; Fachner 2011; Wier 2009), and of course also with virtually every single tradition of ritual, it is my experience that the repetition of actions or movements over long periods of time can produce states of dissociation, which can eventually lead to what we would normally consider as 'trance'. McNeill also describes this 'moving together' phenomenon as 'muscular bonding', which can lead to a boundary loss that I feel is very much connected with the ideas of liminality I mentioned in chapter 1. Writing more specifically about contemporary dance, he describes the feeling experienced of losing oneself as '…the submergence of self into the flows' (McNeill 1995, p.8). As we know, absorption and elation abound in the realm of dance:

> As the dancer loses himself in the dance, as he becomes absorbed in the unified community, he reaches a state of elation in which he feels himself filled with energy or force immediately beyond his ordinary state, and so finds himself able to perform prodigies of exertion. (Radcliffe-Brown 1964, p.257)

The immersion of the dancer, as executor of ritualised repetitive actions, insistently points to a blurring or loss of boundaries, or self-awareness, where consciousness is altered as the music or movement takes hold (Burt 2006).

In 'The Drawing Room' piece, the activity of moving together in and out of synchrony with others provides an experience that fundamentally differs from that of performing solo. Most significantly, the practice of sonic drawing with others eradicates a certain performance pressure, in terms of keeping the drawing movements smooth, active and continuous. It is an emergent sounding result, as each participant affects each other's pace, rhythm leading naturally to entrainment (see Fraisse 1984; Fraisse 1987; Feldman 2006; Phillips-Silver et al. 2010). One tends to unconsciously 'lock in' or synchronise with the neighbouring drawing participant in a complimentary movement,

which reinforce the sound and hence the resulting rhythms. This has the effect of amplifying the experience for all participants as the intensity of the motor components of the drawing ritual contribute significantly to its power. The extra sonic layers resulting from the communal somatic activity helps to encourage absorption, which in turn helps to accelerate feelings of boundary loss.

It is interesting to realise how the sonic layering process works here: with the uncontrollable tendency to entrain with the other performers, there is often the unconscious effort to synchronise; an effort that is sometimes successful, but mostly very changeable and unstable, which leads to the constant temporal displacement of layers, moving in and out of synchrony. This contributes to the richness and complexity of the layering, as well as to the subtle granular timbral differences between each participant's sound drawings, producing a kind of chorusing effect, which in turn gives extra texture and granularity to the overall sound.

In the 'Drawing Phantoms' pieces the idea of the open perceptual mind is, in my opinion, crucial to the process, as openness and expectation enable the ability to intensely focus and concentrate[11] on the action and sound; and in doing so, to exclude all surrounding factors from perceptual awareness. This narrowing of the perceptual focus enables the space for the imagination to take flight. With an open mind and commitment to the process, prolonged exposure to repetitive movements, or sounds, or images, serves to activate the feeling of boundary loss and absorption.

This sensation of boundary loss, which is also often experienced and described as 'feeling one with the universe', is also known as AUB or 'Absolute Unitary Being', a term coined by Andrew Newberg and the late Eugene D'Aquili in their neuropsychological research at the University of Pennsylvania (D'Aquili 1999, p.14). This oceanic feeling of boundary loss which can feel like a mystical experience is proposed by some researchers to have a physiological basis due to the presence of serotonin and neurotransmitters making connections in parts of the brain which otherwise would not be connected (Lex 1979; Lewis-Williams 2002; Lewis-Williams 2010; D'Aquili 1999). Professor David Lewis-Williams, a cognitive archeologist, writer and expert in Paleolithic rock art and Neolithic monuments, has developed a radical neuropsychological model, which I believe is interesting to introduce into this context in this chapter. It is a model describing a neurology of mystical experience –directly related to the notion of apophenia I described earlier– that theorises that we as humans have the propensity to have illusory aural and visual experiences, which we typically feel as mystical experiences, because of the way our brains are 'wired' (Lewis-Williams 2002, Lewis-Williams 2010, (Lewis-Williams & Pearce 2009a):

> The ghost hidden in the machine is a cognitive illusion created by the electro-chemical functioning of the brain. (Lewis-Williams 2002, p.105)

Lewis-Williams proposes here that the realm of the supernatural is an illusion that is actually created by the brain itself. His neuropsychological model describes how through a process of natural selection, we have evolved our propensity for experiencing states of consciousness (mystical, trancelike, supernatural) as a result of our 'neurological hard-wired foundation' (Lewis-Williams 2002, p.112). Ultimately, we humans are hard-wired with our human nervous system and brain so that the natural functioning of the brain creates experiences that can lead us to believe in the supernatural realm[12]; something directly akin to the ideas I described earlier regarding apophenia and our innate ability to induce the phantasmatic. We as humans still have the predisposition to interpret certain feelings and sensations with meaning as being supernatural, when, according to researchers like Lewis-Williams, these feelings may largely result from neuro electro-chemical activity in the active brain. All our 'normal' and intensified mental states would be generated by the neurology of the nervous system and would therefore be a fundamental part of being human in the biological sense. Cultural contexts may of course diminish or amplify their effect, but the biological basis would always be there. Despite its universal nature, the actual content of our phantoms will be naturally modulated all over the world due to the diverse social-cultural environments: while the Inuit may have visions of polar bears and seals in their environment, Irish Catholics will find the Virgin Mary in theirs.

Figure 34 | The Virgin Mary seen –and revered– in a tree stump in Limerick (Ireland)|

4.4 AUTOMATIC DRAWING – GHOSTS AND DISSOCIATION

In the liminal world of the Victorian spiritualists, 'automatic drawing' techniques were often used by mediums as a way to induce an internal trance or channeling a spirit. Spiritualist mediums would appear to fall into a trance during a séance and produce drawings under these heightened conditions. Claims were then made that ghosts or spirits were driving the hands and were the sources of the images. The technique is also connected to the Theosophist and the Surrealist movements (Spare 2007; Baker 2014). Through reflection on my own drawing rituals, I was naturally drawn to these practices and came to the conclusion that there are similarities worth discussing, which relate to my use of drawing as a way to induce the phastasmatic and the use of these automated drawing techniques as a way to access intensely heightened states of focus and creativity.

Automated drawing is a technique that had widespread use during the Nineteenth century –and is still in use today in certain spiritualist and artistic circles– employed to achieve an essentially empty or focused state of mind that could be sustained for the entire duration of the drawing (Phelan n.d.; MoMA n.d.; Maclagan 2013). The term itself is somewhat misleading, as there is in fact nothing really 'automatic' about the process. It is nonetheless mainly used to describe the process whereby images and forms can seem to appear without conscious effort or design, as a result of an intense subconscious drawing session.

In the 1940s and 1950s the French-Canadian artistic group called *Les Automatistes* were also using Automated-drawing techniques (Lanchner & Rubin, 1976). They were influenced by Surrealist André Breton's 'stream-of-consciousness' style and saw the use of these techniques as a way to access the creative force of the subconscious. French artist André Masson was also renowned for his automatic drawings. These drawings functioned for him as essentially equivalent to 'blotscapes'; as a gateway to the subconscious achieved by the exploitation of chance effects and unexpected juxtapositions. He would start drawing with no plan or composition in mind. Without conscious control, he would begin allowing the pen to guide the process and speed of the movement. After some time, forms would be detected in the abstract markings: objects, bodies, animals, etc. from his own internal image bank would emerge, seemingly unconscious to him, in the process. Sometimes he would reinforce these forms to illuminate them and bring them clearly to the surface; other times they would be left in that liminal state of ambiguity. Whatever one believes the source of the drawings to be, the goal would be to find a way to access the creative subconscious and, to use Marcel Duchamp's famous expression, to 'forget the hand'.

Figure 35 | One of André Masson's automatic drawings; untitled and dating from 1923 |

Drawing in this way is a very simple and natural process, and one that we, as children, naturally delight in. Sadly, it is often the case that in later years when we are taught 'how to draw properly'. With the obvious and logical conventions about technique and control, we then quickly lose this natural and spontaneous ability. I am one of those people who think that somehow we all start naturally being wonderful 'automatic' creators, until many of us are led to believe that we cannot – 'really', 'seriously'– draw.

Personally, I have my own technique of repetitive automated drawing, which functions as an effective meditative way to access creative states. Aside from its evolution into a performance, this is more of a daily ritual, mostly done alone as a meditative act. The repetitive drawing process facilitates a way to forget the conscious self, to 'dissociate', and in so doing to bypass all personal aesthetic preferences through encouraging immersion in the act itself.

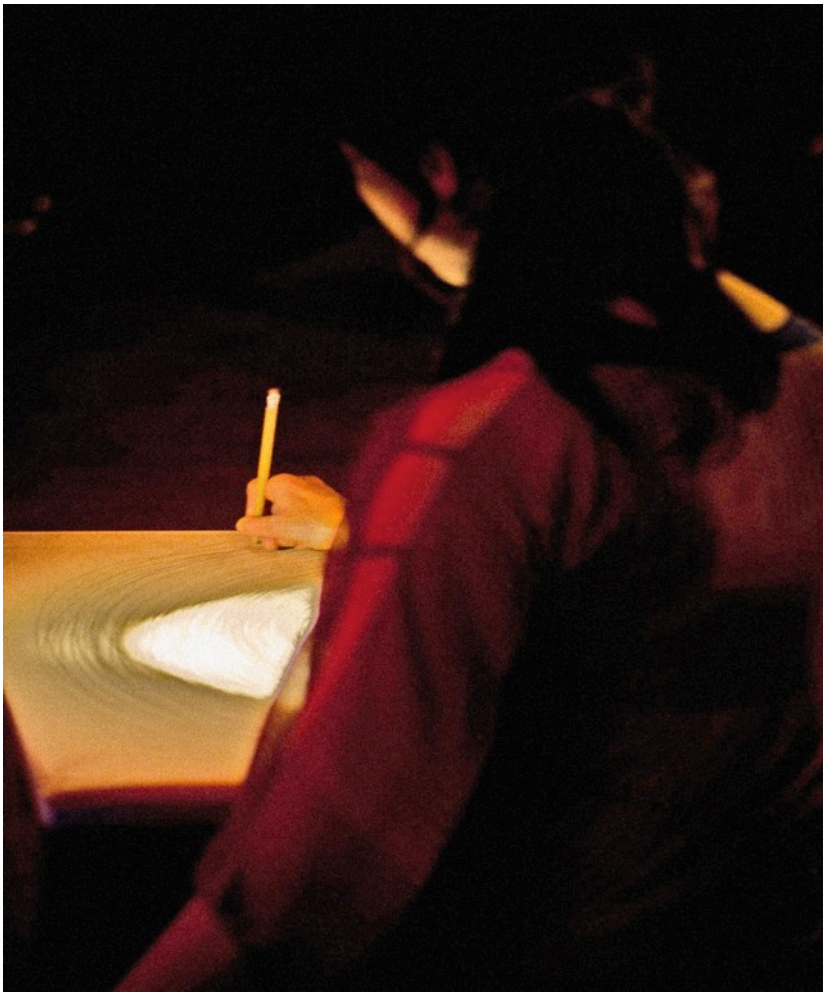


Figure 36 | Losing myself in one of my 'automatic' drawing sessions [Photograph by Erin McKinney]|

As a premeditated and deliberate action, I have spent hours upon hours drawing circles on all kinds of surfaces, during which time I often have the illusory feeling that an external force is driving the pencil. This uncanny phantasmatic sensation can be explained by what is known as the 'ideomotor effect'[13], a movement caused by the idea of its realisation, but it nonetheless is felt as being very surreal and even supernatural. The main objective is in any case to engage fully and completely in the process of circle drawing, without an end result in mind, and 'to inhabit' the movement as the pen moves freely over the drawing surface.

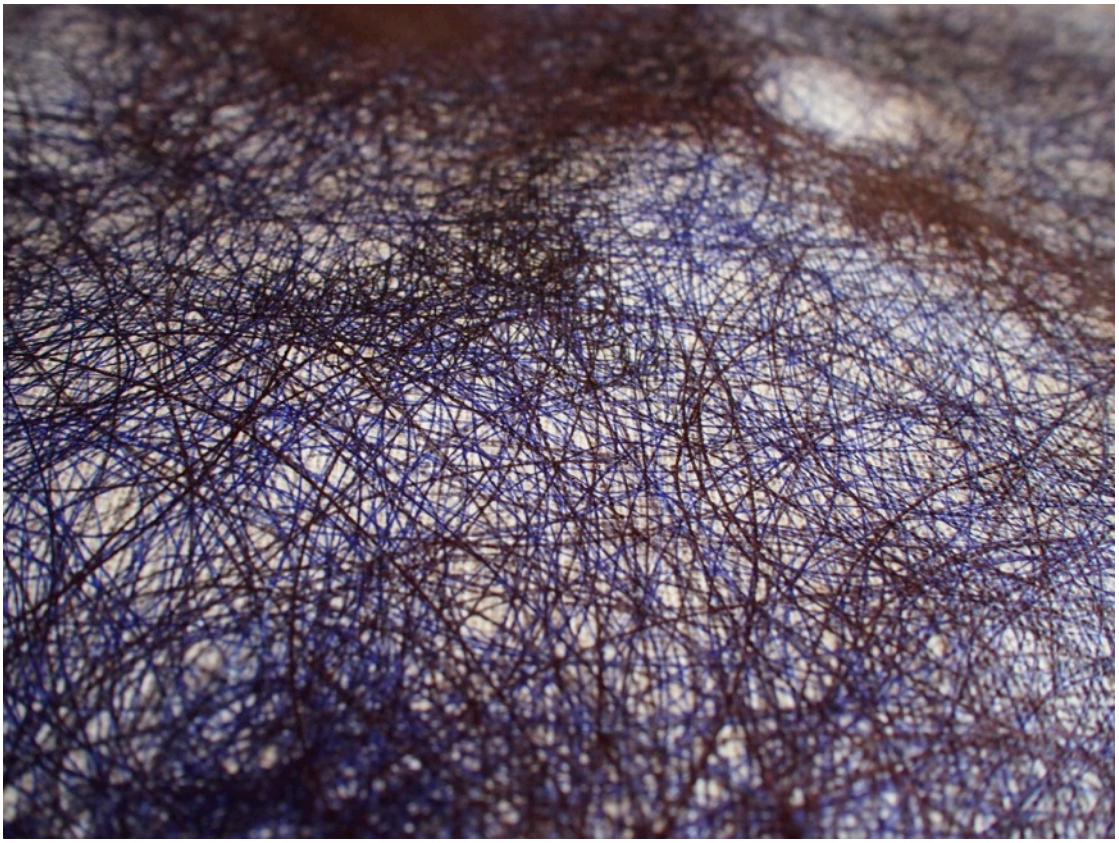


Figure 37| Close-up end result of one of my repetitive 'automated' drawing sessions (2013) |

For me the drawing process is actually never unconscious. Conscious control, however, can often be lost in the intensity of the repetitive gesture, as the drawings appear to take their own shape and to have 'their own life', so to speak. This I see as an experience of 'losing myself' in the process. The looping of the action essentially acts to narrow the perceptual focus, and so it ensures entry into a state of dissociation or trance. The final, densely layered ambiguous markings that are the results of the drawing process, whilst not the objective goal, are the intriguing physical traces of the medium. These traces, in their intricacy, density and convolution, can suggest all kinds of phantasmatic forms to the open, pattern-forming mind.

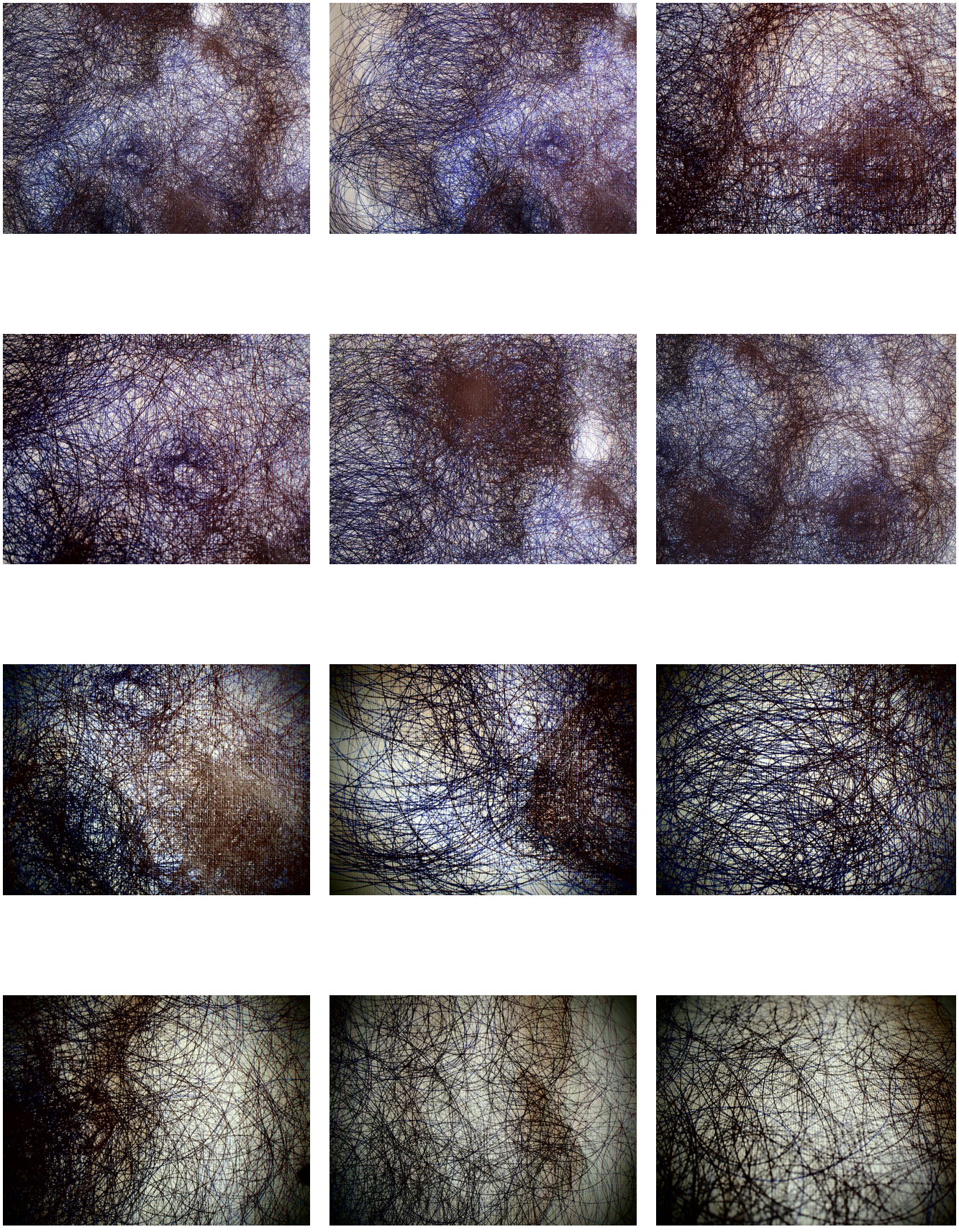


Figure 38 | A selection of my 'automated' drawings (A0 size drawings, 2013) |

4.5 'DRAWING PHANTOMS' PERFORMANCE |

My daily drawing ritual served as a basis for me to develop a solo live work, which eventually became the 'Drawing Phantoms' performance. 'Drawing Phantoms' is a sonic / physical performance using drawing on amplified surfaces, exploiting this medium to manipulate the perceptual auditory image and to lure out sonic phantoms. The performance is essentially built upon repetition as a device to construct and deconstruct meaning and it requires an extended duration (in the range of at least thirty minutes) for successful power and effect.

I see 'Drawing Phantoms' as a performance ritual, involving the repetition of a tracing of shapes on paper, or other surfaces, which are amplified mainly by contact piezo-disk microphones to give rise to repetitive sonic patterns. Over time, these are interpreted by the brain as sonic patterns containing voices. Despite the relentless repetition, in practice and also as a listener, for me the fascination comes from the emergent patterns that appear in the foreground and disappear randomly and spontaneously, providing endlessly-changing listening perspectives.

Figure 39 During one of my performances of 'Drawing Phantoms' (Córdoba, Spain, 2013) [Photograph by Erin Mc Kinney]

The drawing sounds are produced by the rhythmic repetition of continuous movement using graphite and paper on the amplified surface.[AV03] The circles and curvilinear figures are driven by the movement of the arms and hands while drawing, and so they are sonic, visual and somatic at the same time. In the drawing of circles and curvilinear figures, there is significant physical energy used to maintain the rhythm, as well as cognitive effort necessary to keep the continuity of what eventually becomes a semi-automated process. The performance generates several looping auditory patterns, corresponding to the changing visual shapes.

In terms of the specific materials for the 'Drawing Phantoms' performance, I worked with big pages (at least A1 or A0 sizes) of recycled and robust paper rolls, such as large wallpaper rolls. I have experimented with all kinds of pencils, charcoal pens, wax / oil crayons, markers, 'invisible' markers and paint. In performance, I find it effective to use fine-tipped graphite pencils (very durable and hard-edged) for the first part of the performance, which is usually consisting of marking circles in a unilateral 'one-hand drawing' mode. I then switch to wax crayons for the second part of the performance, which is a bilateral set, two-handed drawing with multiple simultaneous transition shapes.

Although I usually begin with pure circles, I have also experimented with other trajectories, transitioning between various shapes to generate different rhythmic and timbral structures. Drawing circles and curvilinear shapes in repetition, though, is a simple and effective way to create strong visual and auditory patterns without requiring much initial conscious thought in terms of execution. Despite the fact that the curvilinear patterns have a stable rhythmic sounding structure, there will always be timbral variations, depending on a multiplicity of factors, like the thickness of the line, the speed of the drawing or the angle and pressure of the contact point of pencil and surface. I can easily vary the speed and pressure of the pencil and so affect the accentuation of the emerging sound patterns. Changing the grip of the graphite has a perceptible impact on the sound of the patterns and I use it as a technique to change the timbre of the sounds and to bring out or accentuate the 'voices'. These voices are then further highlighted and brought to life with equalisation techniques on the amplified sound. This specific accentuation of the patterns in order to produce EVP voice-like sounds (from the tradition of 'Electronic Voice Phenomena') will be elaborated on in a later section.

The physical practice requires intense focus and energy to produce strong driving line drawings and to slowly engage the entire body in the movement. After some time the hand and arm movements feel powerful and automated and then the body adapts to the rhythm of the movements. Fluid motion and symmetry are vital for the development of the rhythmic structure and a continuous flowing movement. I tend to work with strong lines with even, regular patterns whilst simultaneously playing

with subtle variations. Playing with the range of speeds might produce markedly different effects and so attention needs to be paid to speed and timing. I have played with multiple layers of variations and transformations of circular and non-circular patterns in addition to simplifying the process in order to focus on one at a time, extracting one shape and working with it tirelessly to generate the desired amount of sonic phantom patterns.

Bilateral action, working with two hands with different movements, serves to intensify the sonic landscape and strengthen the pattern-making process visually, aurally and physically. It might literally double the intensity of the patterns and gives a new driving force to the piece. Depending on the overall proposed duration time of the performance, I plan and compose the trajectories and transformations of the drawn shapes in different sequences over time. Each performance, therefore, will change in these specific terms as well, depending on the circumstances. The entire process in performance typically leads to the creation of one continuous interwoven curvilinear line drawing. At the end of the performance, the page, initially white, is then covered with densely drawn layers of intricate curvilinear patterns.

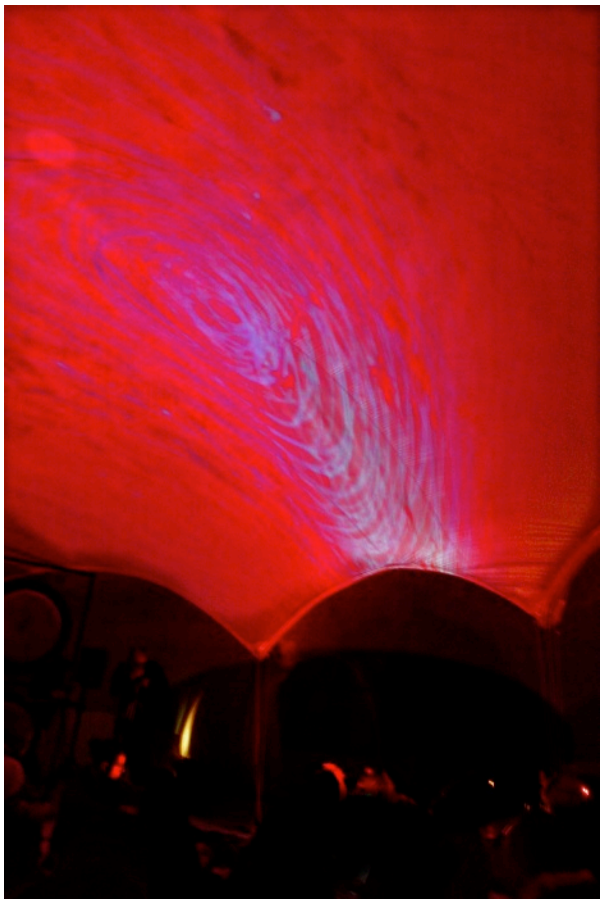


Figure 40| 'Drawing Phantoms' performed and projected in the inflatable multi-dome pavilion 'Sphaerae' during the event 'Inexactly this' at Kunstvlaai, Amsterdam 2012 ('Sphaerae' designed by Cocky Eek; performance program curated by Synergetica Lab, Amsterdam) [Photograph by Barbara Ellison]|

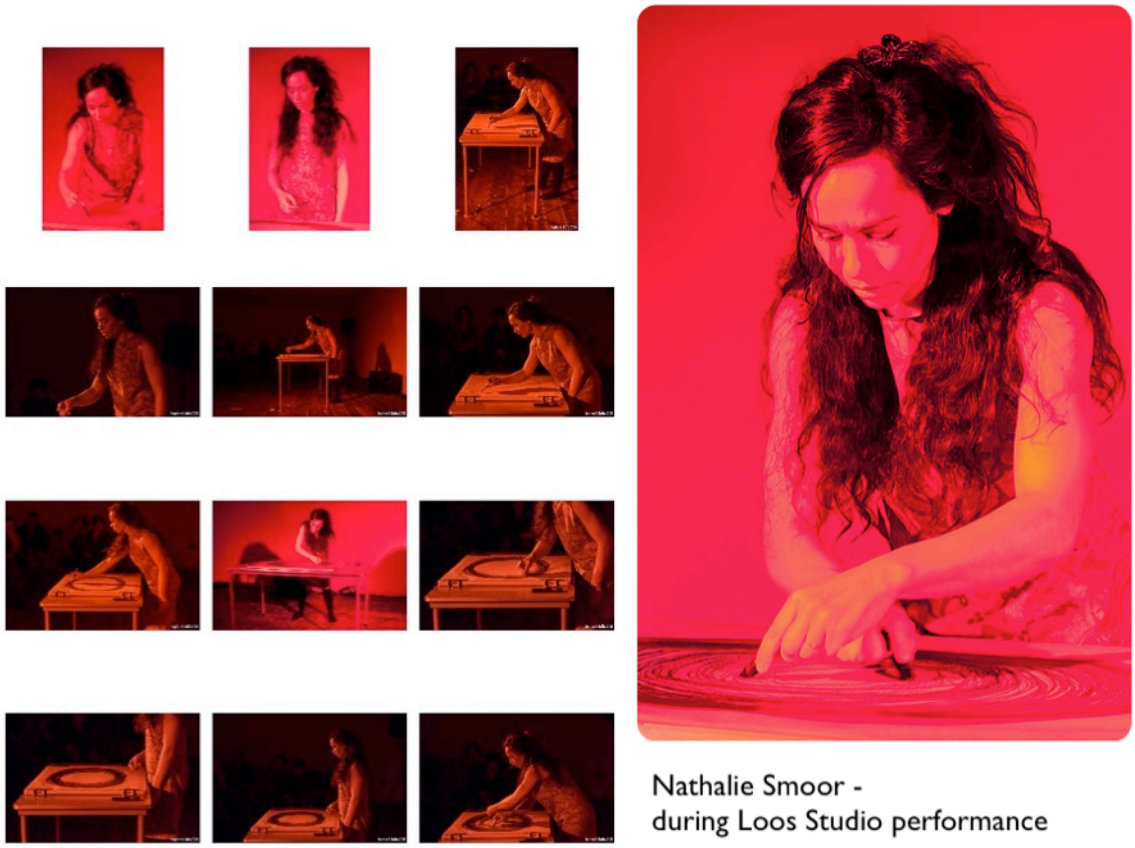


Figure 41 | 'Drawing Phantoms' performed by actress / performer Nathalie Smoor, as part of the series of events 'Éphémère' at Loos studio in The Hague, 2013 [Photographs by Stephan Kaffe] |

4.6 EXPANDING BY NARROWING: EVERYDAY AND INDUCED TRANCE

In my work, one aspect of particular relevance for me is the aim to create a powerful and transformative experience for both the listener and myself. Becoming aware of the techniques for entering into and deepening trance-like states has given me a significant insight on a process that was initially intuitive and mostly unconscious. Creating such states enables us to 'lose ourselves' in the creative process, to create that feeling of heightened emotional experience. This kind of feeling is one that is extremely difficult to describe, but that is nonetheless experienced as a very tangible one.

In 'Drawing Phantoms' the repetitive sounding motor activities are techniques of trance induction. In this case, the curvilinear shape is the basic fundamental primary pattern. It becomes a way to focus in on inner processes and to narrow down the 'floodlight' field of perception to a 'spotlight' focus on the intensified sounds, whilst simultaneously excluding external peripheral factors. Limiting choice with minimal elements establishes an important condition for trance induction. The repeated loop pattern, with its phantom-inducing potential, is a necessary condition for this trance-inducing process. With dissociation brought on from heightened states of absorption comes the

potential for phantom perception and illusion generation (Hilgard 1992; Brown et al. 2013; Pec et al. 2014;). These are temporary liminal zones where we may experience strong perceptual alterations or illusions, such as hearing 'voices' or struggling to distinguish between different forms of apparent reality.

The induction process begins with the rhythmic and repetitive curvilinear movements of drawing, leading rapidly to a focusing and narrowing of mind, a state of hyper-alertness on the task at hand. By restraining the elements of my performance set-up to the absolute essentials, including limiting of the types of actions used, I aim at what we could perhaps describe as 'freeing up brain space', which can then be dedicated to intently and profoundly listening to the sounds produced, with all its subtle variations. For me, the drawing of a circle constitutes the primary cognitive loop. The sonic circles and curves constitute the basis of the piece, which eventually result in a subsequent narrowing of attention on the sounds produced. The mind initially has to concentrate and focus on the specific and limited task of the drawing of the circles, paying close attention to the rhythm of the movement and the resulting amplified sound. When such limiting strategies are taken to extreme levels they produce an effect similar to what is known as 'tunnel vision'[14] (the temporary cognitive preeminence of central over peripheric vision).

All of this naturally relates to our limited capacity to attend to things, which can be expressed as us having a 'spotlight of attention'. We can only take in so much information at any one time. When we focus on a pattern, on the 'figure' or foreground pattern, then we shine our spotlight attention onto it then everything else then becomes 'background', slipping temporarily into peripheral awareness. It is in the context of this natural propensity that I use such 'tunnel visioning' as an interesting way to zoom into a creative process at many different microscopic levels. Somehow, paradoxically, as a way to expand (our attention, dedication, awareness, immersion) by means of narrowing.

Historically, the word trance was used to describe special states such as, in the context of Western culture, that of a Victorian spiritualist medium who enters into it in order to perform their particularly astonishing and often bizarre behaviors, in order to 'connect with the other side'.

Figure 42| The Victorian medium (image : Mac Dougall 2005) |

Today, however, when most people think of trance, they associate it with some kind of exceptional hypnotic state of mind. According to Dennis Wier, director of the 'Trance Research Foundation', the state of trance, which we normally associate with unusual or altered special situations, is more common than we think (Wier 2009). Wier has spent many years practically and theoretically researching the phenomenon of trance, in ways that I see is as particularly interesting and differing from most normal views offered on the subject. For Wier, the term trance can describe an entire spectrum of states of consciousness, ranging from the traditionally considered extremes to much lighter trance situations such as daydreaming (Wier 2009). My perception of trance has been largely influenced by the ideas of Wier, including his 'trance model', as outlined in his two books and numerous articles (Wier 2006, 2009). In general terms, his trance theory has been a useful framework for me in clarifying what are perhaps the essential conditions and techniques required for all trance-inducing processes. More specifically, it has been useful for me to shed light on my own working process with my use of changing looping structures within the framework of ritual and repetition as techniques to induce the phantasmatic in my music.

According to Wier's vision, under such common circumstances as daydreaming, listening to music, surfing the Internet, trying to solve a conceptual problem or watching television, there is a good chance that we are effectively in a trance. It seems therefore that on an everyday basis we regularly enter into what could be described as a state of trance. As Wier puts is, trances in life appear to be as 'common as grains of sand' (Wier 2006, p.24). This kind of state of consciousness will happen to

varying degrees of intensity if we focus on something, to the exclusion of anything else around us. A trance state then can be subtle, or deeply intense and more extreme depending on the conditions. For example, when you are completely absorbed and intensely focused on solving a problem then your awareness will narrow to exclusively focus on it. Such focusing of attention on the singular task means that awareness to peripheral things during this process will more than likely be temporarily limited. If trance is described this way as fixed or limited thinking then we could say that nearly all human activities create some type of trance. In fact, in all types of so-called ordinary consciousness there is always some form of limited awareness. Most specific techniques that forcefully try to induce trance states (for example, meditation or hypnosis) work on this very basis of narrowing the attentional field by focusing attention on a single sound, an image, a movement, etc. (Baker 1990)

> Trance phenomena result from the behavior of intense focusing of attention, which is the key psychological mechanism of trance induction. Adaptive responses, including institutionalized forms of trance, are 'tuned' into neural networks in the brain and depend to a large extent on the characteristics of culture. Culture-specific organisations exist in the structure of individual neurons and in the organisational formation of neural networks. (Castillo 1995)

In these terms, perhaps more mundane and largely less mysterious, a trance can be defined as a state of heightened focal concentration with limited peripheral awareness. Although perhaps incomplete or limited as a definition, I find it useful within the context of my own work to think of trance in this way.

> I define trance as a state of mind characterized by intense focus, the loss of the strong sense of self and access to types of knowledge and experience that are inaccessible in non-trance states. While Rouget prefers to distinguish between states of ‘trance’ and ‘ecstasy’, I prefer a generic category of ‘trance’ that includes meditative states, possession trances, shamanic trance, communal trance, aesthetic trance and isolated moments of transcendence. Trance states can be of different kinds: there is the trance of the performer who feels herself to be one with the music she plays; the mild trance of the listener whose whole attention becomes focused on the music; possession trance, in which one’s self appears to be displaced and one’s body is taken over by a deity or a spirit; the trance Sufi mystics who feel themselves unified with Allah; or the meditation trance of Vajrayana Buddhists, who feel themselves become the deity. Trance is not a digital on/off state. There can be many degrees of trance. Trance is often a learned behavior and thus nearly always bears the imprint of a particular society’s belief about it. (Becker 1994 p.41-42)

Trance is thus one end of the spectrum of ‘intensified trajectory’[15], as put forth by Lewis-Williams (Lewis-Williams 2002; Lewis-Williams & Pearce 2009; Lewis-Williams 2010). In

accordance with this view and that of anthropologist Judith Becker above, I consider the state of trance to be on the extreme end of a spectrum of music listening, of which the other end is what we would call a 'normal' listening experience. Under this vision, trance is fundamentally not a different phenomenon but instead an intensification and amplification of what we know as being a 'normal' and everyday experience of music listening and playing. In the state of trance our perceptual processes seem to operate in more heightened and intensely focused state causing complete immersion in the process, leading to a state where sound is lived and inhabited and not just 'heard'.

Lewis-Williams (2002) describes how trance states may be induced by a variety of means; for example, using sound as a driving force (what is known as 'auditory driving'). The phenomenon described as auditory driving, closely related to that of entrainment[16], is understood as the situation in which there is a 'driving' or feeding of the auditory cortex of the brain with a sound stimulus, in such a way that the neural activity in the auditory cortex synchronises and resonates with the input. Auditory driving (also known as 'sonic entrainment') can be produced by means of persistent repetitive sound loops, like those that take place in drumming or repetitive flashing lights ('photic driving'), where continuous rhythmic movement causes an intense focusing on a single point and has a powerful effect on the nervous system:

> Audio driving, such as prolonged drumming, visual stimulations, such as continually flashing lights and sustained rhythmic dancing, such as among Dervishes, have a similar effect on the nervous system. We also need mention fatigue, pain, fasting and of course, the ingestion of psychotropic substances as means of shifting consciousness along the intensified trajectory towards the release of inwardly generated imagery. (Lewis-Williams 2002, p.54)

Auditory driving describes how our brainwave rhythms and bodily functions such as breathing or the heartbeat seem to entrain to the external rhythmic stimuli; that is to say, they become synchronised to the external auditory rhythm.

It is for this reason that looping and repetition are such powerful trance-inducing mechanisms. The repetition of mantras, the spinning of a dervish, the chanting and drumming of shamans... all induce different trances by limiting our attention and overloading our mind with repeated thoughts. The purposes may be different, and the results will be certainly different, but they can all be considered trances. The looping of awareness is fundamental and from practical experimentation it appears that the looping / repetition strategy alone is a vital prerequisite to induce a dissociated state. When cognitive loops are repeated over and over again in the brain, eventually a type of mental dissociation inevitably takes place. In psychiatry, the concept of dissociation has been defined as 'the splitting off of certain mental processes from the main body of consciousness with various degrees of

autonomy' (Hilgard 1977, 1992), which in this context has normally pathological connotations (closely linked to amnesia, schizophrenia or psychosis; see Pec et al. 2014). The specific dissociation effect that interests me, however, is far less extreme, I believe non-pathological, and more related to the feeling I described before of 'losing oneself' in the creative process. That is the type of dissociative trance I have been aiming at inducing with the repetitive actions and the perceptual conditions of engagement in the performances of 'Drawing Phantoms'.

4.7 LOOP MULTIPLICITY

The state of trance dissociation experienced during the performance of 'Drawing Phantoms' –as it would be the case of other similar performances– is of course subjected to a number of potential distractive interferences. It can easily be disrupted and all illusions suddenly terminated. In order to strengthen and maintain the experience, I have experimented with the use of multiple loops, which can be used during a performance for added complexity and power. These reinforce, strengthen and allow to maintain the stability of the flow, which in turn deepens the state of absorption.

I have experimented with several expanded versions of 'Drawing Phantoms' combining the amplified drawings with constructed mechanical-sounding loops of instrumental sounds in live performance to create an immersive sound environment with multiple trance loops. Stemming from the work I had done exploring the harp looping patterns, I digitally created layers of shifting looping patterns to give rise to emergent ambiguous shifting sonic results, which I then combined live simultaneously with the drawing phantom ritual. The instrumental patterns were composed layering plucked string recordings to produce precise mechanical-sounding results. The next step was to duplicate these patterns and, with some variations and transformations, layer them together in interlocking fashion, to create constantly-changing alternate figure-and-ground focus points. This was based on the experimental idea that it could be interesting to combine the relentless and driving force of the instrumental looping patterns as a way to entrain both sounding sources in the live drawing process.

The multiplicity of loops and sonic layers provides an added level of complexity that keeps the listener and performer engaged for longer periods of time, intensifying the trance effect. In this performance, there is ample room for playing with figure-and-ground relationships, as well as for illuminating, reinforcing or highlighting phantom patterns. When sound patterns and drawing cyclical looping structures are established and lead to entrainment, we can then play with the different accentuation performance techniques to highlight the phantom patterns to bring them to the foreground.[AV21] The phasing and colliding patterns in combination with the drawing patterns create

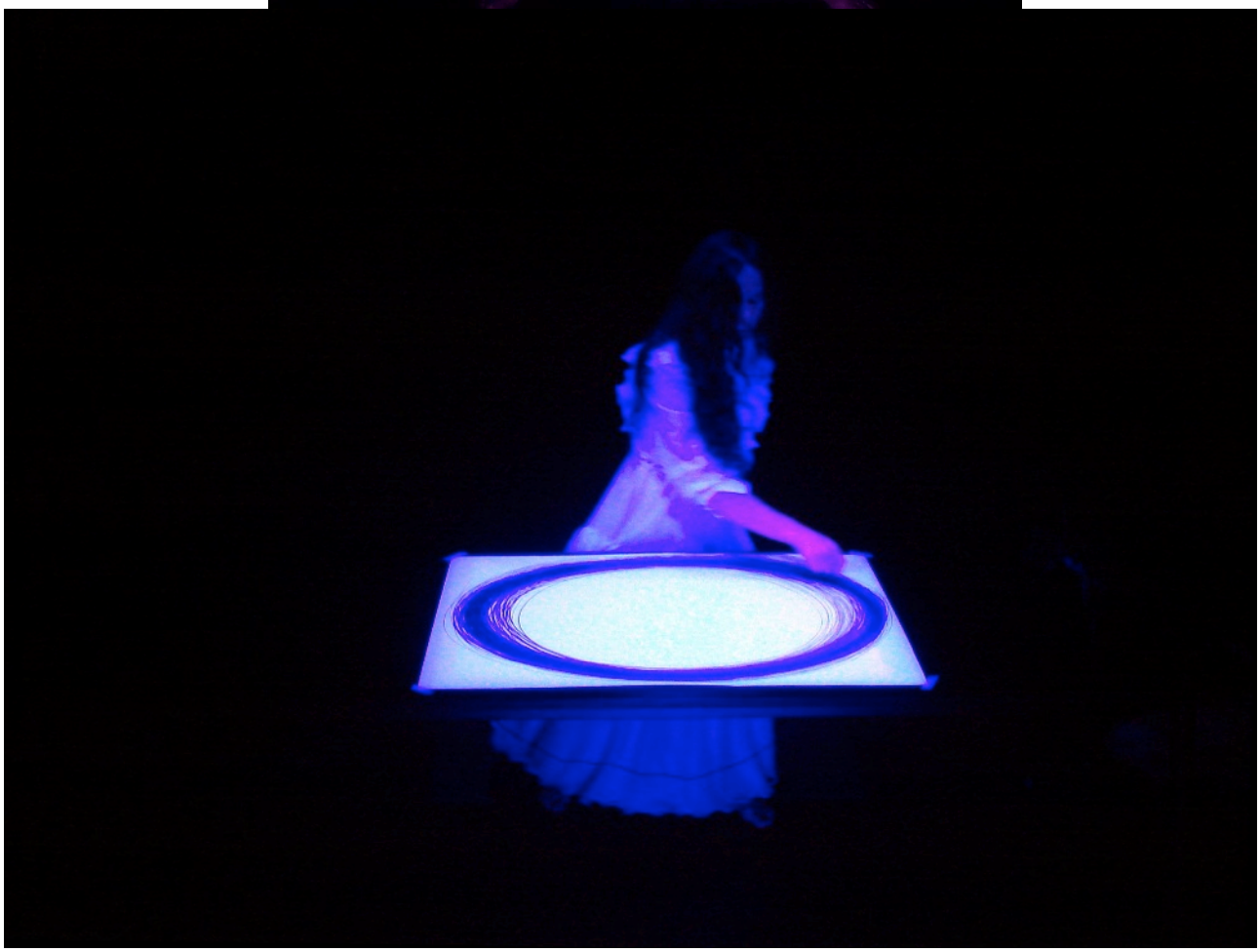
what I have before described as ‘in-between moments’. Multiple loops are also simultaneously created by the switch from unilateral (one hand) to bilateral (two hands) drawing techniques, which adds more sonic and visual layers into the mix.

‘In-between moments’ are those threshold-crossing moments where the sonic texture is at its most ambiguous from a perceptual perspective. Transition phases when patterns are slowing moving at different speeds against each other create such fruitful ambiguity. During these special moments, there is potential for listeners to attend to constantly shifting new patterns emerging to the foreground. In the situation when patterns are identical and phased slowly against each other we quickly hear all kinds of sub-streams and sonic phantoms, due to the auditory stream segregation process (Micheyl et al. 2010; Pressnitzer et al. 2011). As patterns develop and continue, one shifts awareness between these multiple changing states. Each state has its own trance-inducing potential and it is the listening to the combination of states that keeps one engaged. The potential of these in-between ambiguous spaces to spontaneously facilitate the generation of various patterns beyond the control of the listener is one of the fundamental elements I find particularly interesting in this process.

4.8 ‘DRAWING PHANTOMS’ SÉANCE

As described above, my own performances of ‘Drawing Phantoms’ are carried out with a strong ritualistic component. In a further evolution of this series of pieces, I have worked in collaboration with Dutch actress / performer Nathalie Smoor, incorporating more elaborated theatrical and movement elements, to propel this performance ritual into the domain and the tradition of the spiritualist ‘séance’.

In this version of ‘Drawing Phantoms’ the stage scenery of the ritual is carefully set up in its details with the intention of intensifying the performer focus and immersion on the sound and the visual results that she is producing as she performs. All of this is of course strongly modulated –in the pace of actions, in the stage presence, in the lighting, even in the performer’s clothes and hairstyle– by the ‘séance’ nature of the performance. The performer wears a white Victorian-style dress, her long dark hair down in marked contrast over the dress. She stands in front of the white empty page attached to the table and the scene is illuminated from above with black ultraviolet light, increasing the contrast between white dress and black hair, showing only her figure and the table, and darkening everything else around. Over the course of the performance (with an approximate duration of thirty-forty minutes), an additional zenithal spotlight gradually increases in intensity, seamlessly blending with the black light, and reinforcing the visual presence of the drawing that is progressively taking shape from the actions of the performer.



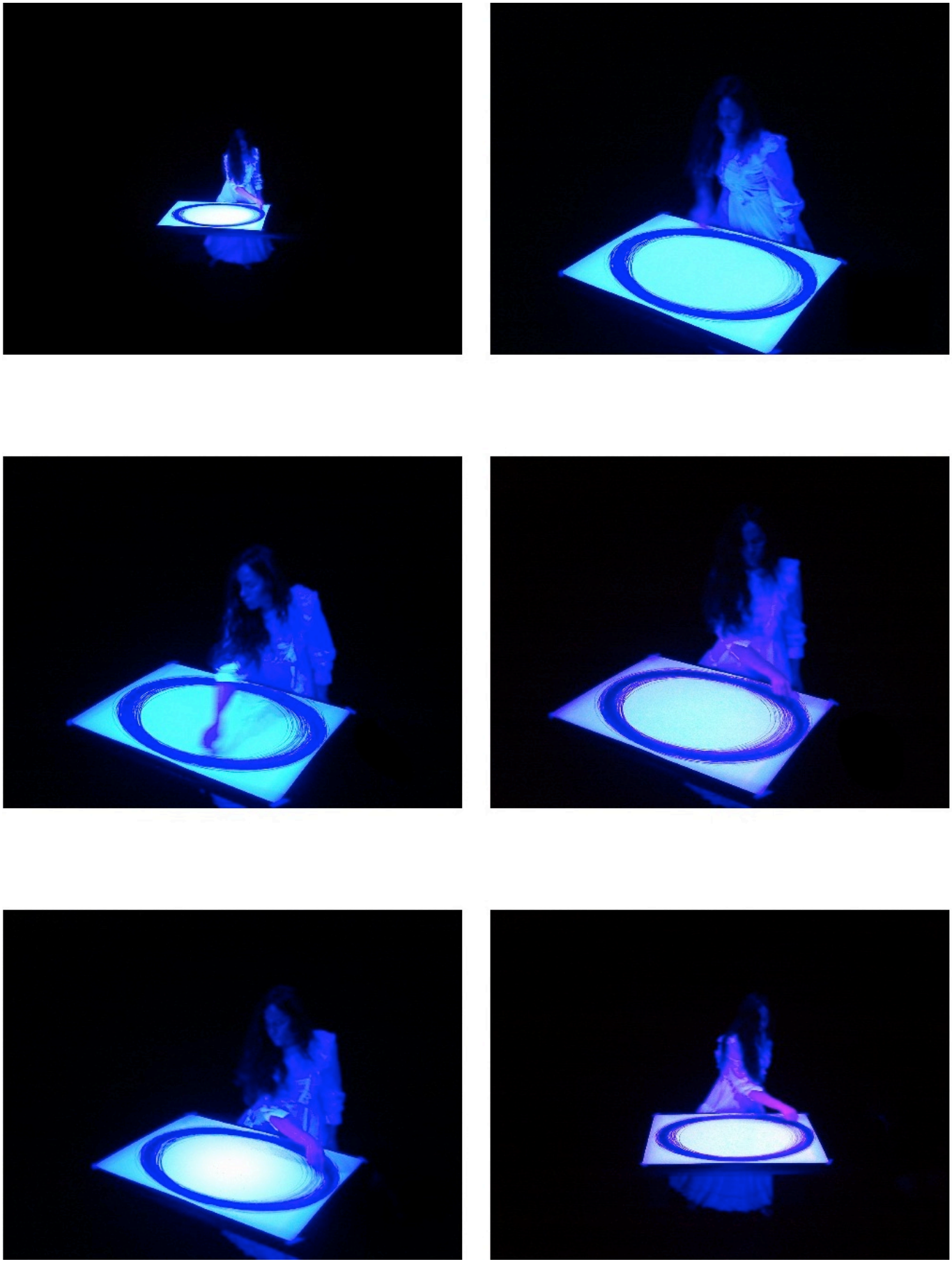


Figure 43 | 'Drawing Phantoms' séance. Performer: Nathalie Smoor. 'Handmade Homegrown' Festival, Dakota Theatre, The Hague, 2013 [Photographs by Barbara Ellison]|

This light and graphic progression is naturally accompanied with a sonic crescendo of increasing complexity, intricacy and inducing power for the generation of sonic phantoms: the 'voices' from the séance. In this version of the performance, I used a computer to transform in real time the incoming drawing sounds by means of various digital signal-processing techniques. These transformations were layered upon the live amplified drawing sounds and the overall output was mixed and spatialised over a quadraphonic sound system set-up around the performer and the audience.[AV19]

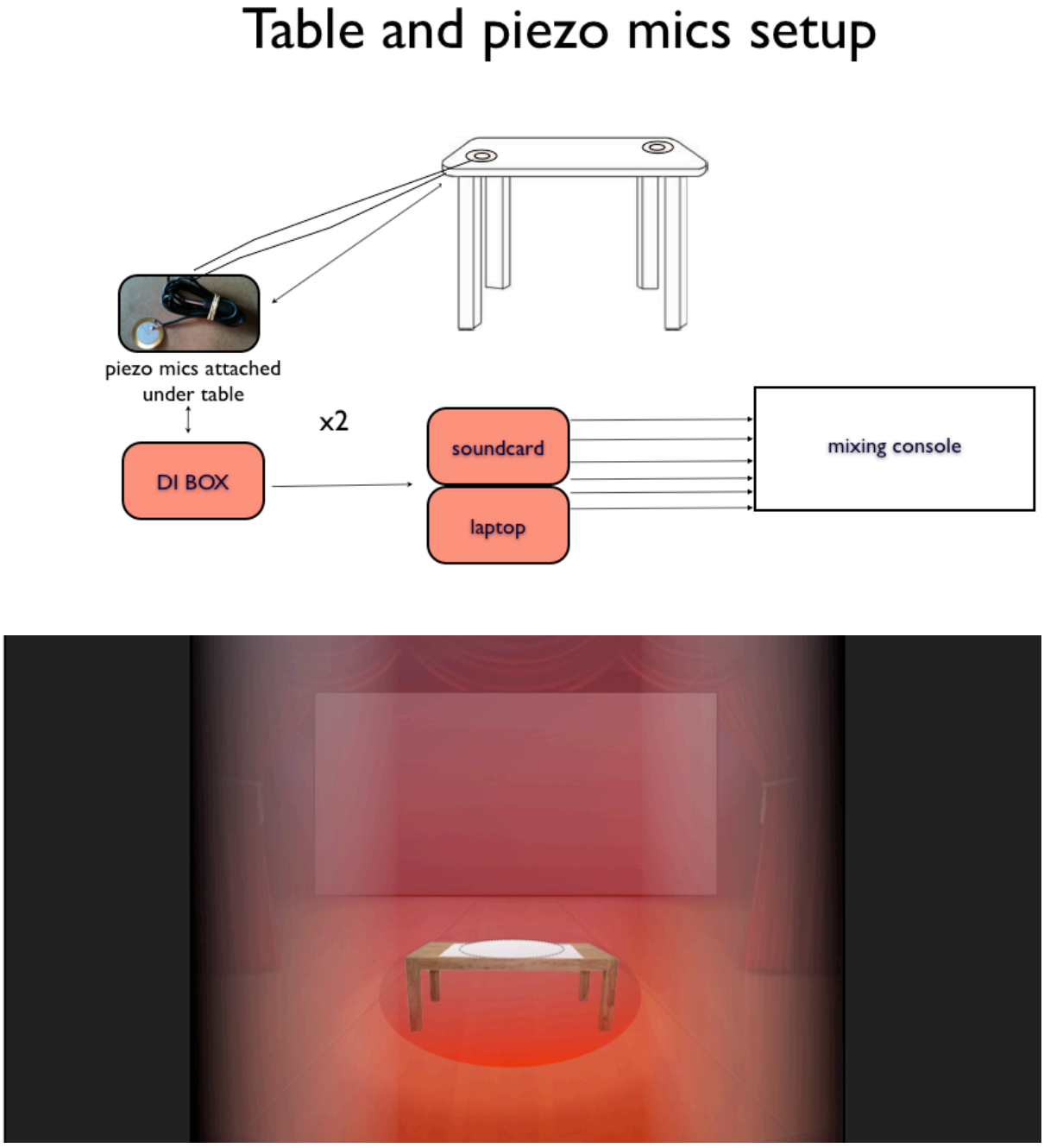


Figure 44| Audio set-up and staging outline for 'Drawing Phantoms' séance |

The results of this ‘séance’, as described in a review of this performance at the Dakota Theatre in The Hague:

> Barbara Ellison and Nathalie Smoor performed the ritualistic and eerie ‘Drawing Phantoms’, where a circle is drawn, repeating the movement over and over again whilst the overtones drawn from the path of the pencil build up to form a powerful and ghostly whirlwind of mysterious voices and harmonies. (review –K. Moore, ‘Handmade Homegrown’ Festival 2013)

Multiple and diverse ‘voices’ are indeed invariably heard throughout this ‘séance’. After the performance at Dakota Theatre, audience members –from many different countries, as it typically happens in The Netherlands for these kinds of performances–reported hearing all kinds of phrases in all kinds of languages. Many wondered whether there were ‘secret’ recordings of real voices embedded into the performance sound. Nothing of this sort was used in this performance; hearing the sonic drawings to produce phantom voices is of course the product of our apophenic brains. The audience members were totally primed to ‘hear voices’ from the very start, and the mysterious atmosphere created in the space with this particular ‘ghostly’ Victorian setting naturally contributed to that effect.

In the context of apophenia, the recognition of these ‘voices’ is a typical cognitive misinterpretation of –or, perhaps more precisely, reaction to– random broadband noise (the general category that includes ‘white’, ‘pink’, ‘brown’ noise, but also other irregular versions of a dense frequency spectrum audio signal). The sonic result of the drawing actions has such a broadband nature, with a mass of multiple simultaneous audible frequencies.

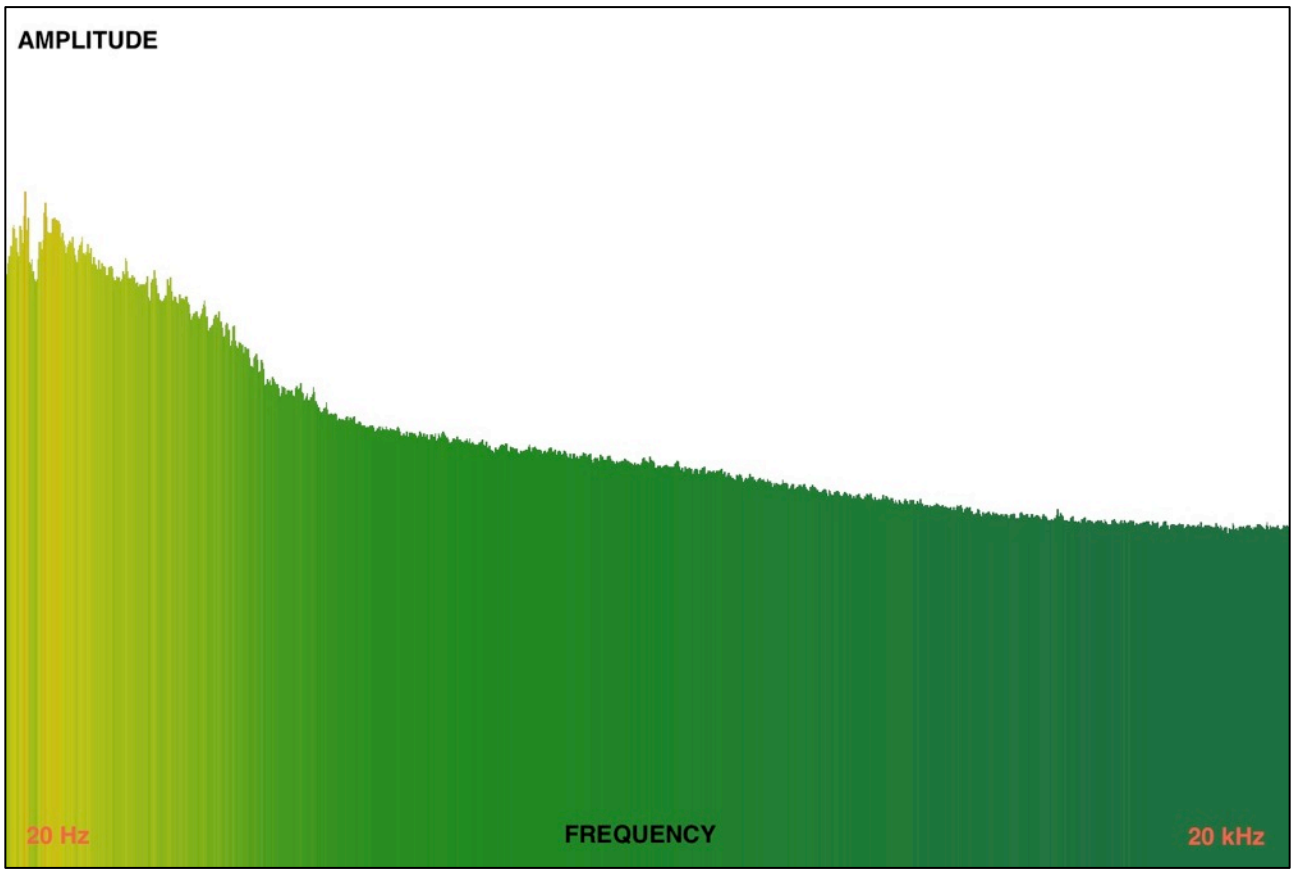


Figure 45 | Spectral graph (amplitude vs. frequency) of a fragment of the live recording of 'Drawing Phantoms'. This sound follows the prototypical spectral pattern for broadband noise, with a relatively even distribution of amplitude across the audible frequency range.

The effect is particularly powerful, for obvious reasons, when we are primed to expect that we will hear 'mysterious voices' or any other implicit or indirect suggestion of that kind. It is nonetheless surprising to see how easy it is for our brains to come to interpret such noise patterns as words once we are provided with the suggestion that we might indeed hear words coming out of that apparently meaningless noise (see Merckelbach & van de Ven 2001; Sacks 2008). As apophenia blatantly shows in so many different situations, our brains are guided to an overwhelming degree by what we expect to hear.

I have deliberately provided such apophenic suggestions in some program text descriptions of 'Drawing Phantoms', or even in variations of the title used for different performances, such as 'The Other Voice' or 'Drawing EVP'. Under such implicit exhortations we then assume we will hear voices and so this sets up an expectation that establishes a mental set making us hyper-alert to detect such vocal patterns. This means that our brains are keyed up to pattern-match the noisy sounds of the drawings with the words we expect to hear. The relentless repetition of the drawing loop will force us to intensely 'tune in' to focus and limit attention on the random noisy sounds. This provides the time necessary to give the pattern-forming brain the chance to 'create' voices that are not actually

acoustically present in the incoming signal. In other words: dynamic auditory apophenia in action. Moreover, our gradual immersion as spectators into the long-duration performance intensifies our 'voice-expectant' mental set by the temporary partial disabling of our critical faculties (a side effect of dissociation), and thus we hear such semantic structures where none exist. Once we cognitively 'hit target' and start hearing vocal patterns, further exposure to sounds will reinforce these sonic phantoms in our perceptual system. The fact that people from different cultures hear different words, and particularly in languages they are familiar with, is additional evidence of the contribution of the cultural framing to apophenia.

4.9 'EVP' AND 'OVP'

Nowhere is this power of suggestion for auditory apophenia as clear, vivid and consequential as in the realm of so-called 'Electronic Voice Phenomena' or 'EVP' (Jürgenson 1964, Raudive 1971, Alcock 2004, Banks 2013).

EVP, which began roughly in the 1920s, is supposedly recorded communication with ghosts, spirits or other paranormal entities, by means of audio recorders and various other electronic devices, like radio receivers (Alcock 2004). Friedrich Jürgenson (1903-1987) is historically identified as the originator of the field. Jürgenson's interest in these phenomena apparently began after he heard traces of human voices on recordings that he had been making of bird songs, in a place where there had been no people present (Alcock 1994). He was completely intrigued by this outcome, which led him to dedicate much time to making recordings in quiet places, devoid of humans and other noises, places where there was 'nothing'. He kept detecting voices in his recordings, and so he undertook a systematic 'scientific' long-term study of this phenomenon, gathering and analysing many recordings; the results of this research were presented in his 1964 book 'Rösterna från rymden' ('Voices from Space') (Jürgenson 1964). Konstantins Raudive, a Latvian writer, took over the work of Jürgenson (they actually worked together for a period right after the publication of Jürgenson's book) and over the course of the last ten years of his life he compulsively recorded multiple Electronic Voice Phenomena in over 100,000 audio tapes, describing the phenomenon and presenting his conclusions in his book 'Breakthrough' (Raudive 1971). Today, EVP has become a realm of specialised interest with perhaps millions of practitioners worldwide and literally thousands of websites devoted to EVP.

The EVP enthusiast goes to a location, often graveyards or haunted houses, and records whatever they find there. A second version of the EVP practice, extracts these recordings from endless sessions of scanning the radio waves with a receiver. Later on, these recordings are played back, listened to carefully (with an apophenic mind, that is) and analysed to detect voices or other

communication purported to be from the world of the supernatural, most commonly 'voices of the dead'. EVP practitioners claim to have thousands and thousands of recordings of ghosts, spirits and other supernatural or extra-terrestrial entities. Notwithstanding the fact that some of these 'voices' are in fact often actual voices from interference bits of radio broadcasts and mobile devices picked up by the receivers, they all can be readily explained by auditory apophenia. Despite the complete lack of any real evidence on anything paranormal in these recordings, it does not take much for enthusiastic minds to hear 'voices' in a multitude of repeated fragments of recordings. Professor James E Alcock (1994) describes the self-reassuring nature of the prototypical arguments of the EVP hunter:

> Some voices of spirits or entities are very close to the background level of static; Others may be clearly heard. If the speech is difficult to understand, remember that the spirit talking may be talking in a language or dialog that is not in common usage today. The voice can also be in reverse, you would need a computer to reverse this to hear it. (Alcock 1994; [www.blueskies.org])

Typically (for some unexplained reason), these recordings are very noisy, and the EVP practitioner will spend endless hours listening to this recorded flow of noise. Unsurprisingly, systematic playback repetition of specific sections of these recordings is probably the main technique used to find the fragmentary 'voices' (incidentally, this unfailing fragmentary nature also goes unexplained). According to the EVP hunter, (the anticipated) EVP are often not easily 'understood' and to detect them one must listen very carefully to specific sound segments many times.[AV106] If we do this, sooner or later we will hear different words, which are then immediately interpreted as, most commonly, messages from the dead. More instructions on how to proceed:

> Recordings typically last only for a few minutes. This is because intense concentration is required in order to hear the voices on the tape, which usually has to be replayed several times in order to decipher the speech. Use of headphones is recommended. (Alcock 1994; [www.mdani.demon.co.uk])

An obvious recipe for noise to become EVP. In fact, another common, but more sophisticated, piece of advice for EVP recording enthusiasts is to make sure to boost the sensitivity level of the microphone to maximum. Even in an environment where there is supposedly 'nothing' to record, this signal boosting will unavoidably leads to a noisy result (here we now have the explanation for the typical noisy character of all these recordings), and hence EVP.

Notwithstanding individual beliefs and personal interests, it is important to stress here that my comprehension of this phenomenon has not diminished at all its poetic, emotional, dramatic and

artistic character. That is why one of the last versions of the 'Drawing Phantoms' project was presented in performance under the title 'Drawing EVP'. I carried out this performance at the 'Störung 9' Festival in Barcelona in April 2014, as part of an evening-long program playfully called 'Lost Spectres & Ethereal voices', in partnership with composer Francisco López (the program also included screenings and surround immersive performances in the dark; all of them with a 'ghostly' character).

Figure 46 | Program flyer of the evening-long program 'Lost Spectres and Ethereal Voices', including my performances of 'Drawing EVP' and 'The Other Voice' at 'Störung 9' Festival (Barcelona, 2014) |

In the performance of 'Drawing EVP' I deliberately raised the noise floor [17] of the contact microphones and applied extreme specific equalisation-filtering techniques on this noisy matrix. Properly manipulated live during the performance (which includes the acoustic specificities of the space), this kinds of level and equalisation techniques can eventually make the drawing sounds appear strikingly speech-like, and therefore generate a multiplicity of 'voice' sonic phantoms. With practice, it is actually feasible to 'sculpt' voices out of the background noise field by effectively simulating

different vowel and consonant sounds through manipulation of audio filters at the appropriate frequencies. **[AV22, AV06, AV01]**

Figure 47 | During my performance of 'Drawing EVP' at 'Störung 9' Festival (Barcelona, 2014) [Photograph by M. A. Ruiz, ©2014 Störung] |

A further, and more relevant, sign of emotional and artistic respect for EVP, as well as a possible way to synthesise some of the conclusions from my work on sonic phantoms, is the delineation of 'OVP', or 'Object Voice Phenomena'. This is my proposed term for what I envision as a much wider phantasmatic phenomenon than the purely 'electronic' of EVP.

As it stands in its own one-century old tradition, EVP manifestly belongs to a profuse lineage of techno-mystical cultural constructions –like spiritualist photography or electrical resurrection– that took shape as a consequence of the widespread social experience of new technologies. As such, I believe that an essential aspect of the ethos of EVP is the consideration, often implicit assumption, of the 'objectivity' of recorders and radio receivers as 'neutral' electronic mediums (here indeed as 'mediums', in the spiritualist sense, as opposed to 'media', in the contemporary technological sense).

Perhaps with a relatively unconscious will to debunk this privileged techno-gnostic status of the 'electronic', or more likely to actually exist alongside it in a complementary fashion, 'Object Voice Phenomena' expresses the claim that all objects, and not only the 'electronic', are potential sources of 'voice phenomena'. They all potentially contain those presences: if and when properly activated –as when drawing on amplified surfaces– they will reveal an endless multiplicity of voices. Electricity is not the only medium. Any object, instrumental or not, even the most apparently quiescent, is also a medium. We just need to know how to induce the phantasmatic in it.

5 *PHANTASMA HUMANA* | The Realm of Voice

COMPOSITIONAL PROJECT: 'VOCAL PHANTOMS'

5.1 IQALUIT / *KATAJJAQ*

In December 2009, in the middle of the Arctic winter, I travelled with artists Stephanie Pan (USA/NL) and Stelios Manousakis (GR/NL) to the community of Iqaluit on Baffin Island (Nunavut, Northern Canada), primarily to conduct research into what is known as *Katajjaq*, or Inuit throat singing[18]. With the invaluable assistance, outstanding hospitality and kind collaboration of many people in this community (see acknowledgments), we had the privilege of experiencing *Katajjaq* first-hand, being allowed to carry out audio and video recordings, and received inestimable direct insights into the techniques and history of *Katajjaq* from local throat singers who were extremely generous in sharing their knowledge and experience.

Figure 48| Iqaluit, Baffin Island, Nunavut [Photograph by Barbara Ellison] |

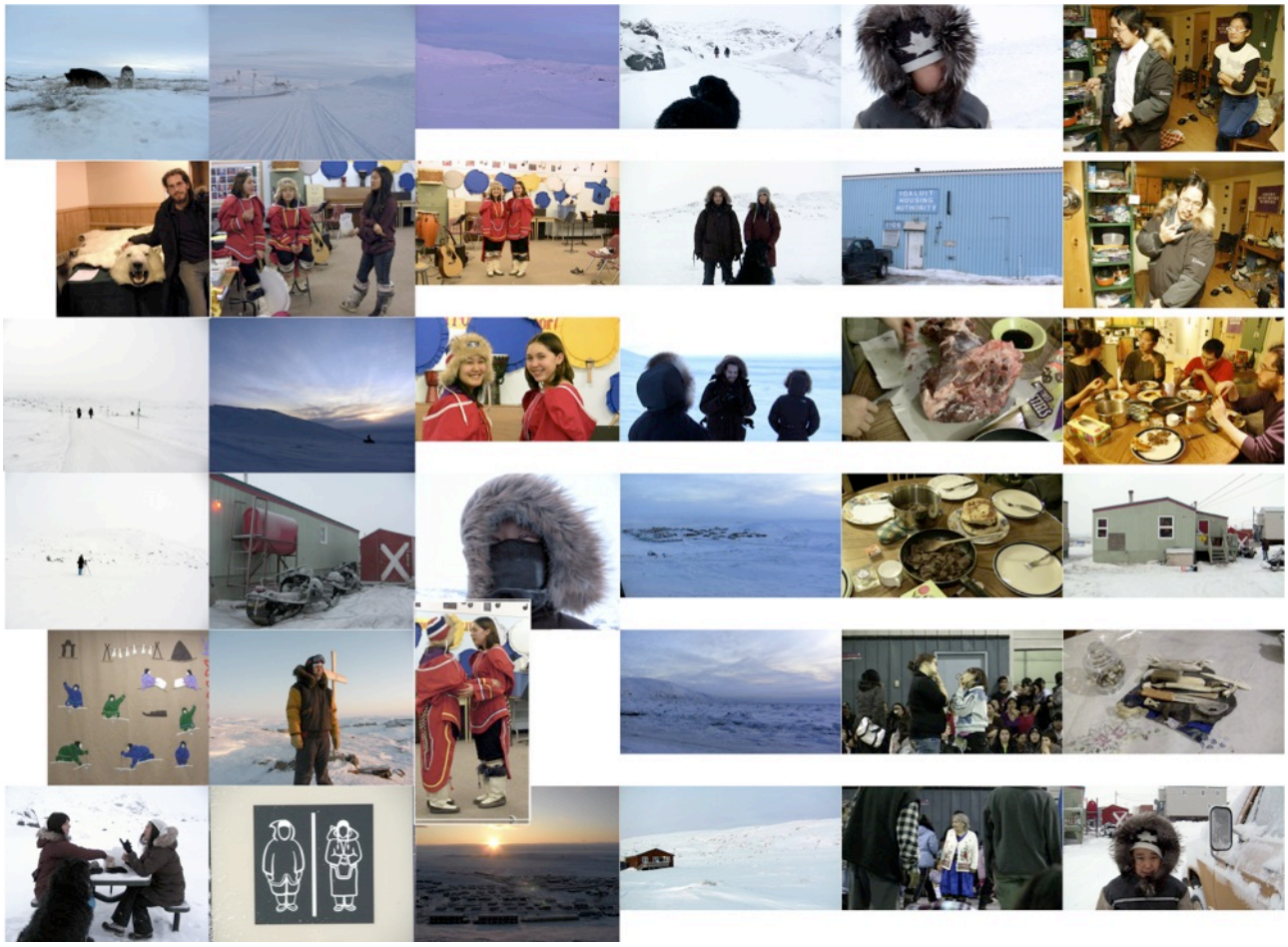


Figure 49 | A selection of photographs documenting the research trip to Iqaluit, Baffin Island, Nunavut 2009/2010 [Photographs by Barbara Ellison]|

This experience inspired and informed an entire series of compositions based on interlocking techniques for both real and synthesised voices, that I have developed over the past four years under the general title of 'Vocal Phantoms'.

Katajjaq is not to be confused with Tuvan or Mongolian throat singing, which is the form commonly referred to when talking about throat singing. It is considered by the Inuit to be more a type of vocal or breathing game rather than a form of music (Nattiez 1983, 1990). *Katajjaq* is an important part of Inuit culture and is practiced almost exclusively by women. It was traditionally used to sing babies to sleep or as a form of entertainment in games that women played during the long winter nights while the men were away hunting, sometimes for periods of months.

This context is important in understanding the technique and the form of this practice. Aside from the personal and collective entertainment aspect of the game, it is also used for practical purposes, such as a breathing exercise to prepare for bad weather or to keep babies quiet. It is therefore a 'game' in a very rich and wide sense that would include very relevant cultural roles having to do

with bonding and communication within the community. *Katajjaq* was banned over 100 years ago by local Christian priests, but thankfully it is experiencing a recent revival, especially among younger generations, who believe that learning it from their elders connects them with Inuit strength and tradition (Smithsonian folkways n.d.).

Katajjaq is usually played with two women, but can involve up to four or five women at a time (Nattiez 1990). The most typical practice of the *Katajjaq* is as follows: two women face each other standing very close[19], holding each others arms and, whilst they vocalise a sequence of guttural and breathy sounds and noises, they shuffle rhythmically back and forth, keeping in time with their vocal patterns. **[AV90, AV108]**

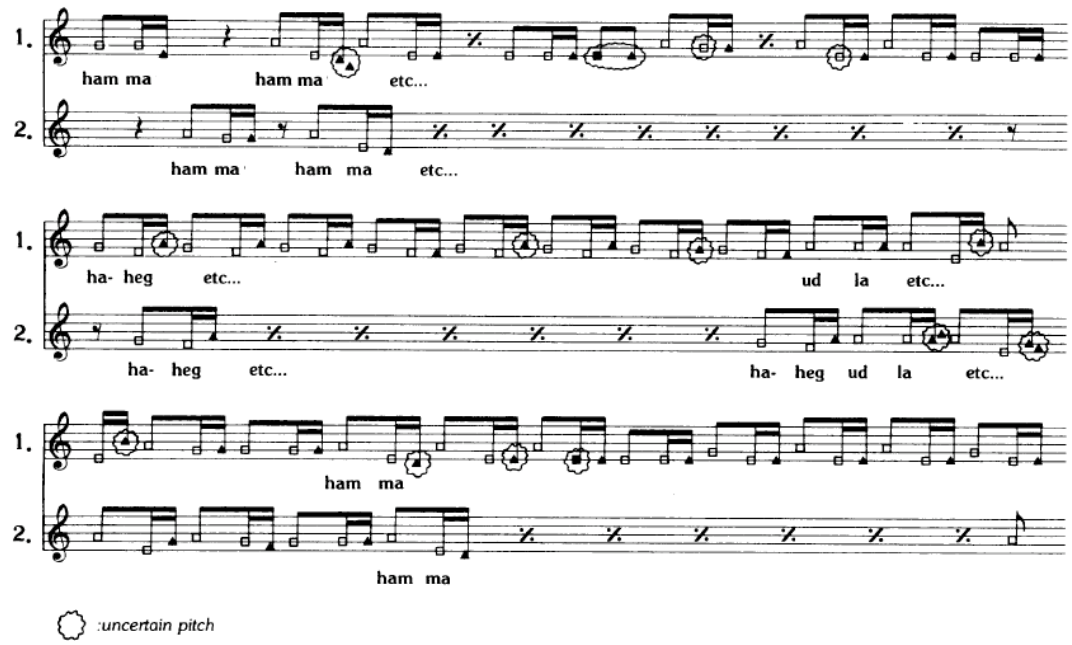


Figure 50 | Score transcription of a complete *Katajjaq* (Nattiez 1983, p.458) |

One woman sings or vocalises the main rhythm pattern with silent gaps, so the second woman can respond in the gaps with the same rhythmic pattern, with a variation of it or with some other complementary rhythm melodic pattern.

Figure 51 | Visual diagram of a prototypical *Katajjaq* (based on one of my own audio recordings made in Iqaluit), showing the interwoven patterns of the vocals motifs. V1 and V2 = the two female voices. The timeline sequence works as in a traditional musical score (each pair of simultaneous voices, from left to right and continuing in the pair line below). The text indicates a written approximation of the phonetic sounds produced. Different colours identify identical or very similar pairedvocal patterns. [System of representation modified from the one used by (Bouvrette, L. & Chalifoux, É., n.d.- *Nunavik : A Land, Its People*)]. [AV108]

The technique involves making short, sharp, rhythmic inhalations and exhalations of breath. Sound is made continuously, voiced or unvoiced, both on inhalation and exhalation. The singers try to fuse the combined sounds they produce so that the 'audience' cannot distinguish one singer from another. When one of them introduces a new sonic element into their pattern, the other has to follow immediately to match. They follow each other in interlocking mode so that the strong accent of one partner's vocal pattern is superimposed on the weak accent of the other.

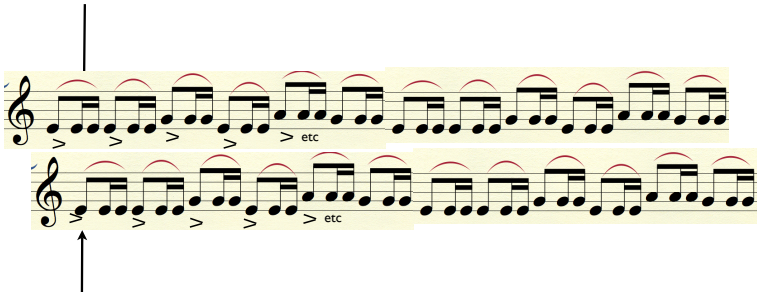


Figure 52 | Simple notation of the structural arrangement of interlocking motifs in a *Katajjaq*, with indication of the alignment of accents |

This superimposition and alternation of weak and strong accents creates perceptual ambiguity, which is an essential part of the form. Using this technique they deliberately create a powerful illusion in which the listener cannot determine which voice is singing which part. In the *Katajjaq* all sounds seamlessly appear to come from one source. Through this ambiguity one experiences an impressive and seamless stream of sounds and noises, which generate a multitude of interesting sonic phantoms.[AV90] Aside from the playfulness of the game, this illusion is one of the most fascinating aspects of this practice for me, as there is such a perceptual mismatch between what you see and what you hear. The *Katajjaq* is a very inventive game of playful endurance, as the game ends when one woman laughs, when she cannot keep up with the pattern matching or when she runs out of breath.

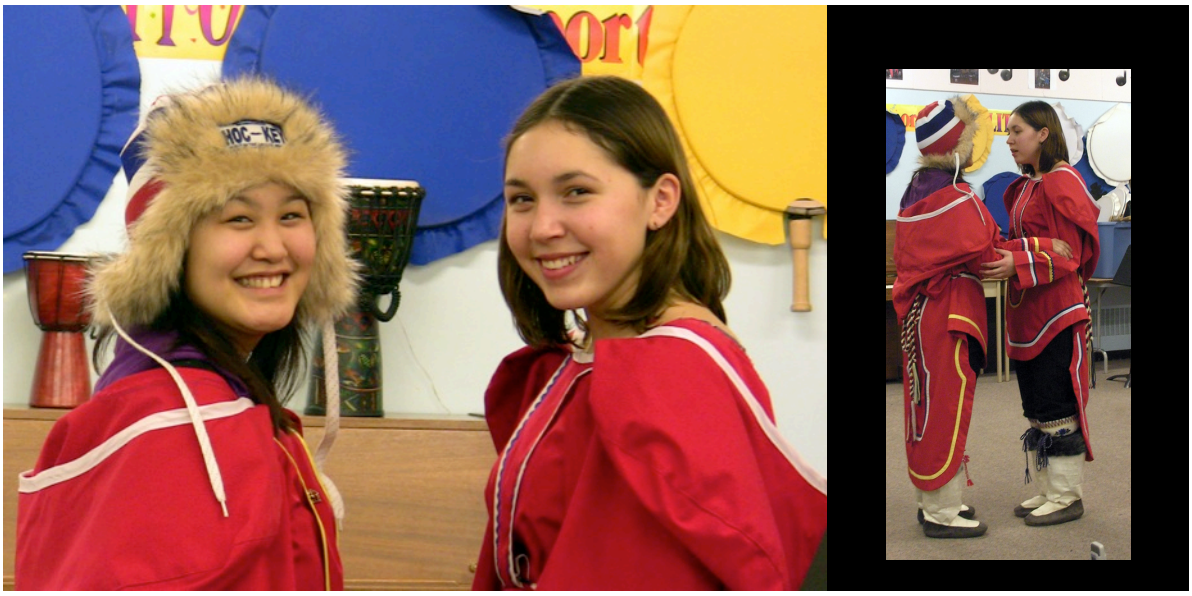


Figure 53| Young *Katajjaq* performers from Iqaluit, Sandra Ikkidluak and Crystal Mullin. They kindly carried out the *Katajjaq* I filmed for the audio-visual examples of the accompanying audio-visual documentation [AV108] [Photographs by Barbara Ellison] |

5.2 VOCAL TECHNIQUES OF ILLUSION

The sounds of nature have been in many cases a powerful source of inspiration in the music (as well as in other cultural manifestations involving sound) of different cultures around the world. For the Inuit people, all kinds of sounds heard in their Arctic environment might be inspirational and are permitted for use as the basis for the voiced patterns in *Katajjaq*. French-born Canadian musicologist and semiologist Jean-Jacques Nattiez has described the *Katajjaq* as a 'host-structure', because its basic rhythmic and breathing structure absorbs sound sources of various origins: meaningless syllables,

archaic words, names of ancestors or old people, animal names, place names (Nattiez 1983, 1990). *Katajjaq* vocalising also often imitates animals, which in our recordings alone included seals, walrus, geese, seagulls, dogs, and mosquitoes. They also often imitate natural sounds like wind, water or sounds of waves on the seashore (Nattiez 1983, 1990). The range of sounds used (musical tones, vocables, imitative natural / animal sounds, noises) is extensive. The Inuit are open to using all such sounds as long as they can they can maintain the illusion that all sounds come from a single source.

In relation to the generation of sonic phantoms, we find again a crucial structural interlocking organisation of the combined parts. The partners vocalise their motifs in alternating patterns of voiced / un-voiced and inhaled / exhaled sounds, with the total effect resulting from the motivic superposition of the de-phased voices (see, e.g., Nattiez 1983a). If, for example, each motif contains a low-pitched sound followed by a high-pitched one (or the contrary) and if the two voices follow each other by half a beat, we get the impression of hearing two distinct streams of low-pitched and high-pitched sounds, respectively.[AV108] This streaming effect contributes to the puzzling conflict between the 'played' motor image and the experienced auditory image in the *Katajjaq* and hence to the intriguing sonic phantoms that result from the seamless interlocking of the two vocal parts. It is a sonic phantom that could be compared to the inherent patterns generated in the Amadinda xylophone music (see chapter 3) in that both interlocking voices are creating each of the sounds heard. Just as intentionally, in the vocal games, with conscious awareness of illusion creation, the stronger the illusion –that one voice is producing a sequence of hard accents (beats) and the other is producing a line of soft accents (off-beats)–of the two different voices to create these two distinct streams of sounds, the more successful the game is. It is an intrinsic goal of the practice to make it difficult for the listener to tell who produces which sounds even when one understands how the game is played (Beaudry 1988).

Factors that contribute to this illusory effect include spatial proximity of the players and similarity in their sounding vocal qualities (range, timbre). These qualities are deliberately and skillfully used by the players to encourage perceptual ambiguity in the listener, which results in the desired prominent mismatch between what is seen and what is heard. The auditory streaming processes, linked with these specific timbral, pitch and spatial organisations, are responsible for the appearance of sonic phantom patterns, and the more skilled the players in the execution of the *Katajjaq*, the more spectacular the sonic phantoms will be.

Interestingly, some radically different cultural manifestations that have no ethnic, historical or geographical connection whatsoever with the *Katajjaq*, employ somewhat equivalent vocal techniques for similar illusory interlocking effects. The prime example is so-called 'beatboxing', which is part of a popular modern tradition of vocal percussion; a relatively recent urban practice that exploits many

vocal techniques that imitate beat-producing machines (somehow a paradox, since these machines in fact already imitate –at least in their origin– acoustic percussive sounds). Like in the case of the Inuit vocal games, beatboxing includes the widespread use of inhaled and exhaled sounds to produce very convincing sonic phantoms. In the case of 'beatboxers' however, they typically perform alone and their aim is precisely to create the illusion of a kind of polyphony with multiple 'rhythm-box' sound sources. In a recent article characterising the beatboxing style, the authors suggest that these types of rapid alternations are used to create auditory illusions and are employed because they can encourage the perceptual timbral streaming of the sound layers (Stowell and Plumbley 2008). They aim to trick the listening brain into perceiving certain sound events (basslines, drum machine imitations, vocals) as taking place simultaneously. Some of these techniques also involve the rapid alternation between vocal timbres, producing multiple streams.

5.3 'VOCAL PHANTOMS'

I have been very inspired by the inventiveness and playfulness of the *Katajjaq*, in its all-encompassing use of all kinds of interlocking sounds and noises to generate sonic phantoms. I have used both human voices and computer 'text-to-speech' sampled voices as tools and materials to explore different phenomena through the intensive and extensive use of repetition. One of these is the phenomenon of 'semantisation' (Beheydt 1987), that is, giving meaning to arbitrary 'meaningless' sounds after prolonged repetition. A closely related effect is that of 'musicalisation' -generating rhythmic structure and apparent melodic lines and harmonies of non-musical sound material. Interestingly, we can also generate the opposite phenomenon, known as 'semantic satiation' (Jakobovits 1962), which implies a dissipation of meaning, as a consequence of the repetition of meaningful structured sound, particularly words.

'Vocal Phantoms' is a collection of pieces that focus obsessively on the use of patterns of speech[20]; the generation of rhythm and meaning, as well as the breakdown of meaning, from the relentless repetition of morphemes, phonemes, words, sentences, phrases, etc. With these pieces, I move from composing with only syllables, or phonemes, to single word constructions, to entire phrases. What interests me is the way in which the shifts between such patterns at different scales manipulate our attention and force us to continually shift and change our listening focus. These pieces play with rapid switching between listening levels. For example, at one level we might hear a recognisable word; on another level the phoneme, morpheme or the formant; whilst on yet another level we might hear only acoustic features of a sound, its frequency, amplitude, duration, etc. At each level, the sounds generate their different meanings (acoustic, semantic, informational, etc.), which are

entirely dependent on the context or framework in which they unfold. As I will discuss later with the phenomenon of semantic satiation, meanings attached to words, objects or events degenerate surprisingly quickly when their framework and context disappear.

The pieces that form this collection are divided between those that use recorded live voices and those that use computer-generated voices. I will start by describing a piece for multiple live voices, which was directly inspired by the *Katajjaq*.

5.4 'VOCAL PHANTOMS #18' (FOR LIVE VOICES)

'Vocal Phantoms #18' is a composition for an unspecified number of voices and can be adapted to work for a minimum of only two or for any multiples of two partner voices (increasing the number of voices will obviously affect the textural complexity of the piece). Although the number of voices is variable, it is nonetheless important that each set of two partners have voices that match each other's timbre as closely as possible. I am presenting here a version for four voices, divided into two groups of two interlocking duos.

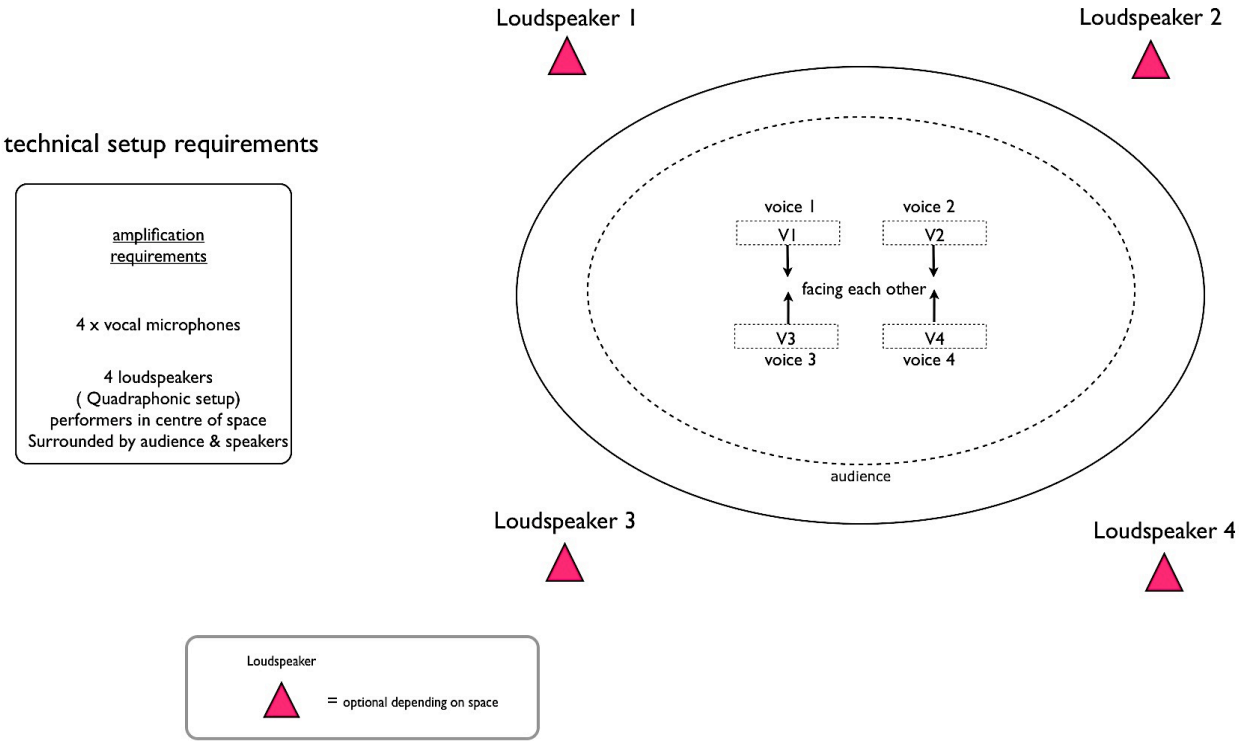


Figure 54 | Live performance set-up for the piece 'Vocal Phantoms #18' (part of the score of the composition) |

This piece is constructed with players performing alternating short looping patterns of vocal sounds in duos. These sounding patterns are composed of selected vocables or morphemes (i.e., non-lexical combinations of certain sounds or letters without meaning) that are vocalised as discrete units, such as *joun-ba, heanba, em-ha, ha-mahe-ma, mmm-maa, hi-yah*. Each one of these small units, essentially separated by breathing intervals, is what I consider as a 'motif'. These motifs become the building blocks of the piece. Each motif gives rise to its own spectral and temporal patterns, which upon repetition bestow it with its distinctive character. Crucial to the process, the motif sounds must be generated both by inspiration and expiration of the airstream. This then results in a pattern of alternating breath, voiced and unvoiced (unclear pitches)[21] sounds producing distinct intonation and noise patterns. The breath should ideally be as audible as possible and can be used in a melodic way. Depending on the motif, it can demand a combination of a kind of half whispered and half sung sounds. The succession of syllables or morphemes chosen, which make up the motif, gives rise to a constantly repeated rhythm, which creates a regular intonation contour, albeit not necessarily with fixed pitches.[AV42]

I have explored and built up a repository of various motifs, with differing rhythmic and morpheme patterns, intonation contours, voiced or voiceless (half whispered) patterns, and with different use of inhaled and exhaled breathing sounds. This serves to provide a significant openness in the composition, since I can then select, combine and adapt diverse motifs from this repository depending on what I feel can work best for a specific performance, according to the specific players and duration chosen.

Regardless of the motif's features, each is repeated a specified number of times between the partners, which establishes the stable ground pattern and creates the illusion of a continuous stream of sound. The partners' motifs are either identical or a variant but predominantly offset in time, to create a dephasing between the vocal layers. The total repetition count of each motif will depend on the overall duration of the piece. There are variants on the types of structural organisation used organising the motifs. In the score for this piece, the motif patterns of voiced and voiceless, inspirated and expirated sounds, are all differentiated with various graphic notation symbols[22].

The structural organisation of all these materials is based on three types of alternation:

1. The two players of each pair alternate a single, repeated motif 'A'.
2. The two players of each pair alternate two different motifs 'A' and 'B' (occasionally, they might switch to an unison configuration of the motifs).
3. A series can be created in which the two voices alternate in performing motif 'A', then motif 'B', then motif 'C', and so forth.

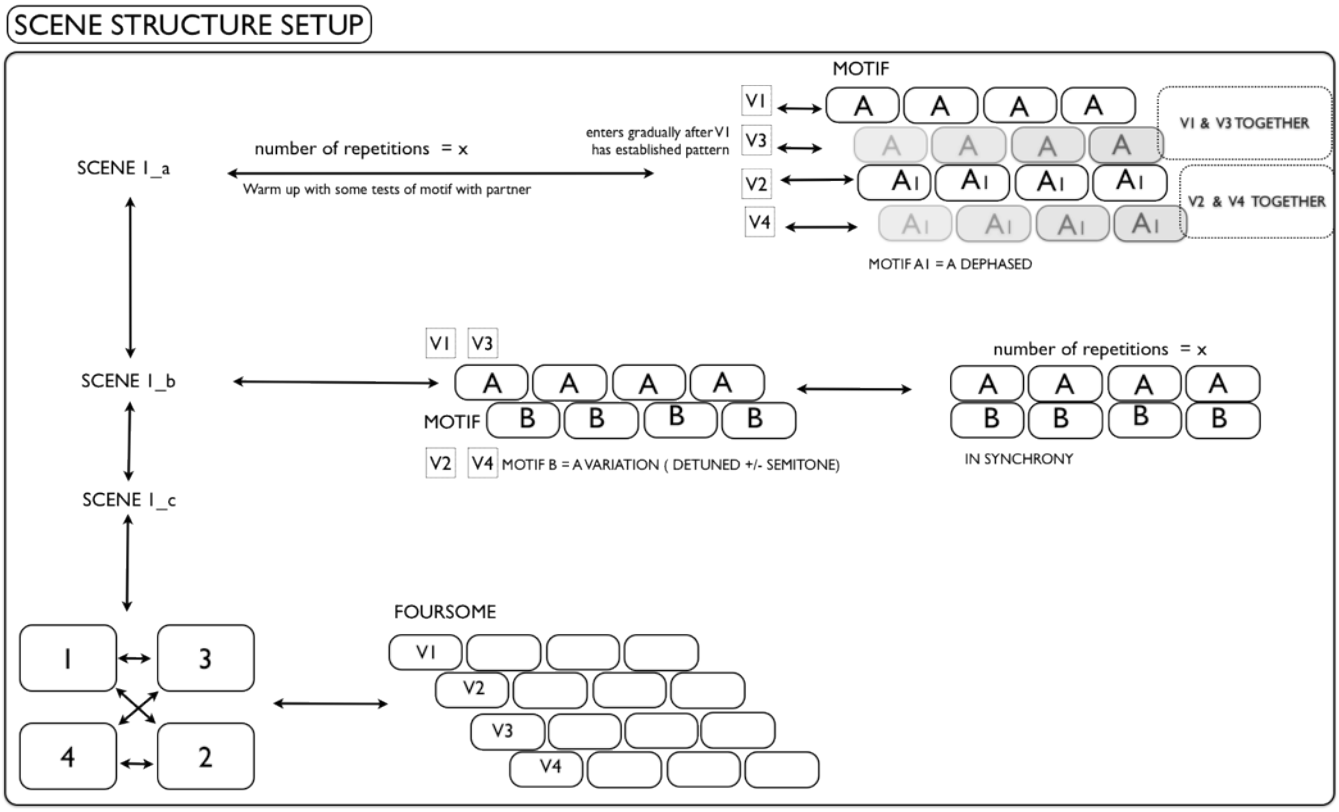


Figure 55 | Examples of organisation of motifs in 'Vocal Phantoms #18' (from the scene structure set-up section of the score of the composition). V1, V2, V3, V4 = voices of different singers. A, B = motifs. In each group of blocks (motifs) the timeline sequence works as in a traditional musical score, from left to right. |

The organisation of this piece, as performed by several voices, gives rise naturally to the same phenomenon that is patent in the *Katajjaq*: a striking mismatch between the motor and the sounding image; the difference between what is played and what is heard[23]. A composition might be constructed with a particular set of interlocking parts. The listeners' perception, however, is guided to a great extent by the auditory streaming effect and they will hear the emergent *Gestalt* instead. Due to the use of very tight alternation between parts and their pitch and timbral organisation, perceptual confusion arises. Listeners perceive patterns that are not played as such by any of the singers / players, but are instead results of the perceptual restructuring mechanisms of the brain. There is a mismatch between the regular and symmetrical structure of the music's formal components and the asymmetrical shape of the emerging phantom patterns.

I see all of this as the equivalent of deliberately composing with ambiguity and confusion themselves, so to speak; working specifically with the contrast between what is being played versus what is being heard. Achieving interesting results in this territory of intentional confusion requires a careful organisation of the elementary units, so that, despite their patent individual simplicity, they

give rise to a multiplicity of rich *Gestalt* perceptive streams for the listener. This allows, for example, a single simple pattern to be organised so as to give rise to complex sub-stream patterns, or an individual performer being able to generate a kind of indirect polyphony.

5.5 'VOCAL PHANTOMS - TEXT-TO-SPEECH' PIECES

While 'Vocal Phantoms #18' is constructed from meaningless vocal units (in terms of language), I have developed an entire series of 'Vocal Phantoms' compositions –under the sub-category of 'Text-to-Speech'– that explore the striking mutability of 'meaning', in both semantic and musical terms.

It is a fascinating phenomenon that virtually any fragment of spoken speech, when looped and repeated, inevitably acquires a 'musical' character; words transforming into song, so to speak. The intensely looped cut sequences of seconds of found film footage by Austrian experimental filmmaker Martin Arnold, for example his 'Passage à l'acte (1993)' [AV64], is a powerful and clear example of this phenomenon. Diana Deutsch, an American researcher in psychology, well known for her research on musical illusions and paradoxes, demonstrated this effect in a series of experiments on what she called 'the speech-to-song illusion'[AV111] (Deutsch et al. 2008, Deutsch 2009). As anybody with experience in the work with looped audio samples knows very well, this process of 'musicalisation' is not exclusive of recorded speech; it is, however, particularly marked, apparent, widespread, and even probably consubstantial, with this type of material. Any particular sequence of speech sounds can appear to be heard as either speech or music (in the sense of 'musicalised'), depending on the amount of repetition of the word or phrase considered. If the spoken text is played once it is naturally heard as spoken text, but after being repeated a number of times, it will be heard as 'music', with melody and rhythm. Since we are used to hearing repetition in music but not in everyday speech, the 'speech-to-song' phenomenon in fact reveals that there exists a 'musical' way of listening. We thus shift from hearing the words as words to hearing them as if they have marvellously and playfully transformed into melody and rhythm. Once this musicalisation transformation takes place, the perceptive focus is on the 'musical sounding' of the material[24].

In the 'Vocal Phantoms – Text-to-Speech' ('VP-TTS') series of compositions[AV25-AV38] I have extensively played with –among other things– this process of 'musicalisation', through the use of a text-to-speech utility on a computer. Text-to-speech (TTS) is a type of speech synthesis application that is used to create a spoken sound version of raw text in a computer document. TTS (now used widely in the gaming and animation industry) is essentially a semi-artificial production of human speech from converted typed text and was originally implemented as assistive technology for example, to enable the reading of computer display information for the visually-impaired, or to aid in the

reading of a text message. Samples of recorded chunks of speech or entire words and sentences are stored in a database, and then linked together to recreate the text selected. I have mainly used TTS applications with sample-based real voices, as opposed to synthesised voices, to compose my pieces.

Figure 56 | Performing my piece 'The Other Voice' (part of the series 'Voice Phantoms – Text-to-Speech' compositions) at Störung 9 Festival (Barcelona, 2014). For some sections of this piece I created visual avatars of women to 'speak' the vocal phantoms. [Photograph by M. A. Ruiz, ©2014 Störung] |

Unlike repetitions with manual or instrumental means (as in my 'Harp Phantoms' and 'Drawing Phantoms'), the use of 'text-to-speech' utilities, combined with digital audio editing techniques, makes it possible to create sample-accurate copies of speech / sound patterns, allowing an exact repeatability of any text / audio fragment. A digital clip can be created and copied as many times as required or desired for the piece. In these 'ideal' conditions for repetition, despite the fact that all 'copies' of the repeated fragment are identical, the perceptual experience of the listener is never one of static uniformity, but rather one of continually shifting changes. As mentioned before, it is precisely the use of repetition that engenders this transformation of a shifting perceptual experience. It is us as listeners, therefore, that do not remain the same and each time we hear the repeated segment again, a combination of expectation and memory reframes and transforms our experience of what we hear. Our normal speech patterns consist of sequences of 'known' signals and we have come to expect certain sequences of patterns and arrangements of signals (words, sentences) according to our given rules of

speech. When we are exposed to repeated identical signals, our brain eventually find alternatives, as it tends to expect the next sequences to be different to what went before.

Getting the computer to read intricate (both meaningful and meaningless) textual patterns with a TTS application and recording and editing the audio output, I have created an extensive repository of sonic micro-loops (in the range of 50 to 500ms) for the purposes of making these text-to-speech pieces, with various combinations of patterns and layers of these small audio units in synchronous and asynchronous organisations. The 'VP-TTS' pieces have been composed in this manner, using these techniques as a way to increase the complexity of the initial material and to explore forms of considerably intricate polyphony that are possible only with digital tools.

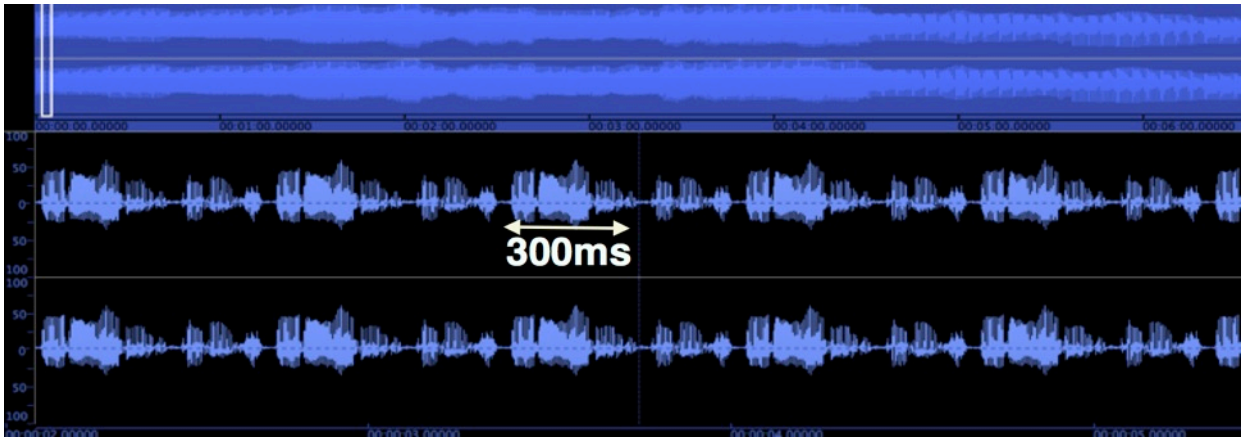


Figure 57 | Example waveform of a prototypical pattern of repeated micro-loops in one of my compositions from the series 'Vocal Phantoms – Text-to-Speech' (section from the composition 'AV35 -|Vocal Phantoms tts#11|' |

Although in some occasions I have used dictionary-based words, most of these micro-TTS loop units and the small repetitive patterns created with them are meaningless letters, phonemes or sequences of both that were chosen or produced essentially on the basis of their timbral or percussive qualities. Each composed pattern is continuously repeated in a regular fashion and forms a distinct layer with its own morphological characteristics. Some of the simpler constructions constitute what I would call 'monomania' pieces in their own right; simple but full of phantom-inducing power. In these more stripped down compositions an initial sequence is composed and built up to form a stable pattern. This pattern is then slowly transformed in some manner; for example, deconstructing and contracting the loop as new samples are gradually introduced to replace existing samples.

In the more complex and more densely layered pieces, I have combined such layered patterns in different configurations, stacking and offsetting them against each other to create densely detailed textures. The symmetry and alignment of layers in their simultaneous organisation, as well as their composed internal microstructure, have a paramount effect on the complexity of the emergent sonic image. As in the case of the looping process used in the 'Harp Phantoms', the construction of these

pieces involves first setting up at least two identical (or almost identical) patterns to initially play together in synchrony, aligned and panned to center position. The purpose of this is to first establish a 'ground' pattern that is presented over a sufficient duration of time to become stable (this duration varies depending on the sonic features of the pattern itself). Once this ground pattern is stable enough to be 'internalised' in the short-term listening memory, a replica of it is added in a different layer but with a micro-shift in time with respect to the first one. Layers can be shifted or nudged incrementally to very fine degrees of resolution using digital software tools. For reasons of aesthetics and of perceived efficiency in generating sonic phantoms, my usual choice of average time shift between layers in these pieces has been in the range of 10 to 50ms.

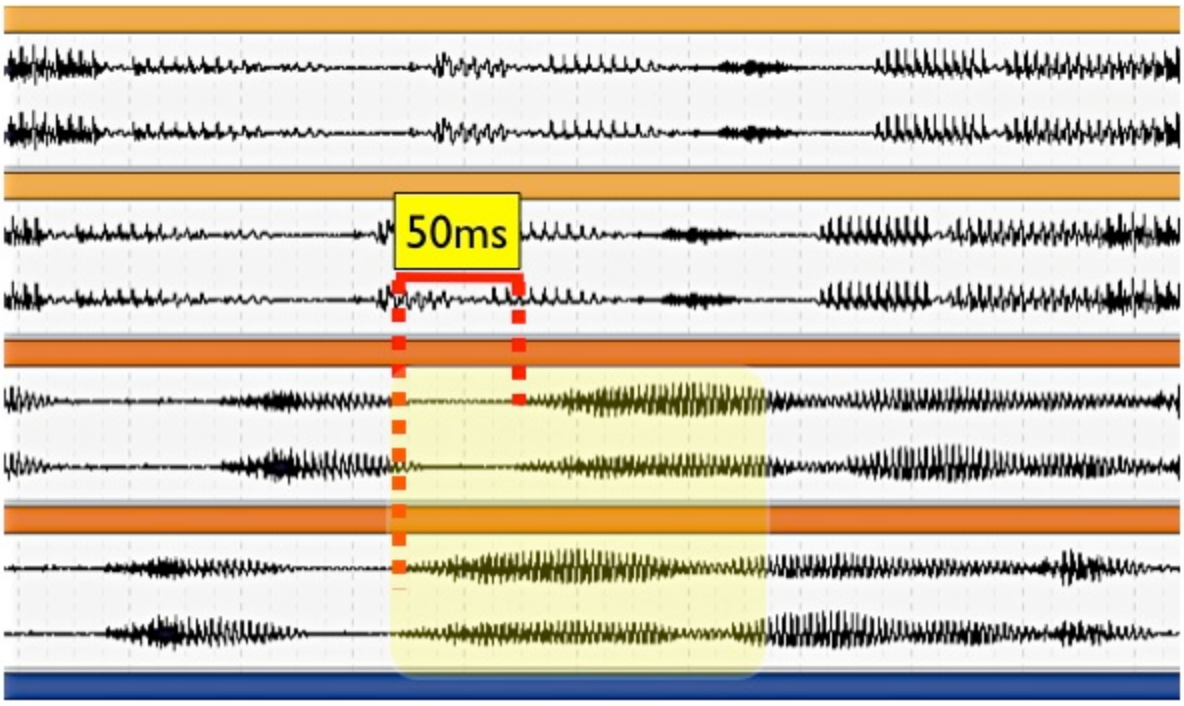


Figure 58 | Example of an average offset / time shift (50ms) between tracks (layers) with repeated micro-loops (shown as waveforms) in one of my compositions from the series 'Vocal Phantoms – Text-to-Speech' (section from the composition ' vocal phantoms 08 ' |

5.6 MICRO-TEMPORAL MECHANISMS

The techniques described above for my 'Vocal Phantoms' pieces, as well as those employed in *Katajjaq*, can be contextualised and better understood in terms of perceptual mechanisms in the light of the research and experiments carried out by Diana Deutsch on what she called 'phantom words illusion' (Deutsch 2003, 2009). In these experiments, Deutsch used looped recordings of two words or a single word with two syllables, presented separately but simultaneously through a stereo pair of loudspeakers. The two sequences of sounds are played simultaneously on both speakers but the tracks are offset in time so that when the sound of the first syllable is playing on the left speaker, the sound of the second syllable is simultaneously playing on the right speaker [AV112] (Deutsch 2003). She explains that:

> Because the sounds coming from the two loudspeakers are mixed in the air before they reach our ears, we are given a palette of sounds from which to chose, and so can create in our minds many different combinations of sounds. (Deutsch 2009)

Since the same words are repeated displaced between the two channels, this causes ambiguity and confusion and so we can hear all kinds of shifting words and phrases that are not there, as our cognitive system attempts to make sense of the aural ambiguity.

These experiments help to clarify how the sonic phantoms emerge from the *Katajjaq* or in my own 'Vocal Phantoms' pieces. In the *Katajjaq* the strong accent (first part of the word-like repetitive sound) of one voice coincides with the weak accent of the other, and viceversa. This produces two very distinct perceptual streams of sound: one seemingly composed of the succession of strong accents (beats) and the other apparently composed of the off beats. The illusion that one voice appears to be producing a stream of hard accents and the other is producing a stream of soft accents is because of the displacement between the voices (channels in a studio piece / experiment). One has the impression that the two voices are producing two different series of sounds, when in fact both voices are creating each of the sounds heard. Both the spatial distance and the timbral similarity between the voices are critical for the illusion to work.

In constructing my own 'Vocal Phantoms' pieces I regularly use this form of structural organisation of two or more sequences of looping sounds, i.e., using two identical copies (or a slight variant) of the same loop and presenting them with offset to both channels left and right simultaneously. These sequences of sounds therefore arise simultaneously from different regions of space. In general, as each loop 'motif' contains a low-pitch sound followed by a high-pitch one (or the contrary), and since the two tracks (or live voices) follow each other with a time lag, we have the

impression of hearing two separate distinct streams, one composed of low-pitched sounds and a second one of high-pitched sounds, even though both types of sounds have been produced alternately by each voice track (or live voices). The aim is that the resulting emergent sound image produces such homogeneity of sound that listeners or spectators are not able to discern the separate sources.

As already mentioned in chapters 3 and 4, for sonic phantoms to emerge there must be sufficient repetitions of the looping material. There is a threshold at which the number of loop repetitions, combined with the number of elements in the loop itself (the 'motif'), will be sufficient for the induction of phantom patterns. Below this threshold, there will not be enough time for the perception to reach that 'phastasmatic' state. With sufficient exposure, as the primary motif patterns are internalised, perception is freed from having to concentrate on those particular patterns and it has the cognitive 'space' to invent and create new ones. These new secondary patterns are automatically picked out and brought to attention via the shifting of figure-and-ground relationships amongst the patterns. Each new pattern that is foregrounded into conscious awareness and then internalised brings about more dissociation, and all these multiple dissociations provide more chances for the hearing of sonic phantoms.

Again from trial and error, experimenting with different lengths and judging results by 'perceptive' ear (i.e., in terms of the sonic illusions), I have observed that the combination of the length of the loop itself and the number of differentiated sonic elements it contains, is critical to attain the effect of its dissipation into independent streams of sound. When there are too many elements in the loop, or their independent durations are too long, this will weaken the effect of dissociation. In these kinds of pieces, too many elements in the loop make it difficult for the brain to internalise the patterns or retain them in memory. Shorter looping structures are in general more effective, and any attempts or strategies to achieve mechanical precision, even when performed by live voices, will greatly contribute to the effect. In terms of the average duration of the loop units that I have used in my 'Vocal Phantoms' pieces (as mentioned before, in the range of 50 to 500ms), this work could be located within a temporal realm that is intermediate between most usual repetitive musical structures and the more strictly micro-temporal domain of granular synthesis 'microsound' (where the average sonic 'grains' are in the range of 10 to 100ms) (Roads 2004).

The content of the loop motif needs also to be carefully considered, so as to be eventually repeatable by the mind, and thus provide strong sonic phantom-inducing structures. As discussed previously, the semantic content of the loop itself does not influence the effectiveness of the trance-inducing process. Any arbitrary or random choice of meaningless content, therefore, will in principle serve for the purpose of inducing a state of deep absorption (at least at a primary level). Form a sonic / aesthetic perspective, however, the content of the loop will naturally affect the timbral and rhythmic

quality of the phantom patterns. This will have a relevant effect on how interesting and engaging the experience will be for the listener. Consequently, although the purely sonic content of the loop will not affect the initial induction, I have experimented with gradually transforming the looping content elements over time to offer a sonically richer aesthetic experience.[AV34, AV36]

5.7 SEMANTIC SATIATION AND SEMANTISATION

In Edgar Allan Poe's short horror story 'Berenice' (first published in 1835), Egaeus, the protagonist, who has a tendency to fall into periods of intense focus often leading to dissociation, describes a psychological state, a monomania, that amongst other things, induced him

> [...] to repeat, monotonously, some common word, until the sound, by dint of frequent repetition, ceased to convey any idea whatever to the mind (Levine & Levine 1989, p.72)

It is quite remarkable that to increase familiarity with a word during a learning process, repetition is required, but with too much repetition a threshold is eventually reached where this cognitive pattern becomes suddenly defamiliarised. Within the same type of repetitive process, what was once a regular ordinary word with attached meaning is suddenly transformed into a kind of strange phantasm of sound. This monomania that Poe describes in his story is an example of 'semantic satiation', a psychological phenomenon in which the uninterrupted repetition causes a word or phrase to temporarily lose meaning for the listener (Jakobovits 1962)[25]. This phenomenon highlights the arbitrary nature of our conventions to connect and associate certain sounds with certain meanings. We are all familiar with the experience of repeating a word over and over again, until the word becomes strange and meaningless. Even words loaded with emotional content, like 'mother' or 'blood', words that are normally for us solidly familiar and clear, uncannily transform themselves in our perception in strange phantasmatic ways. Virtually any word we choose will start to sound peculiar –in this particular way of meaning dissipation– if we repeat it audibly enough times. This phenomenon creates an in-between state of unfamiliarity and strangeness; one that hovers in a temporary zone between meaning and sound. The act of writing a word or a phrase repeatedly has a similar effect, one of dissociation, disorientation and fragmentation.

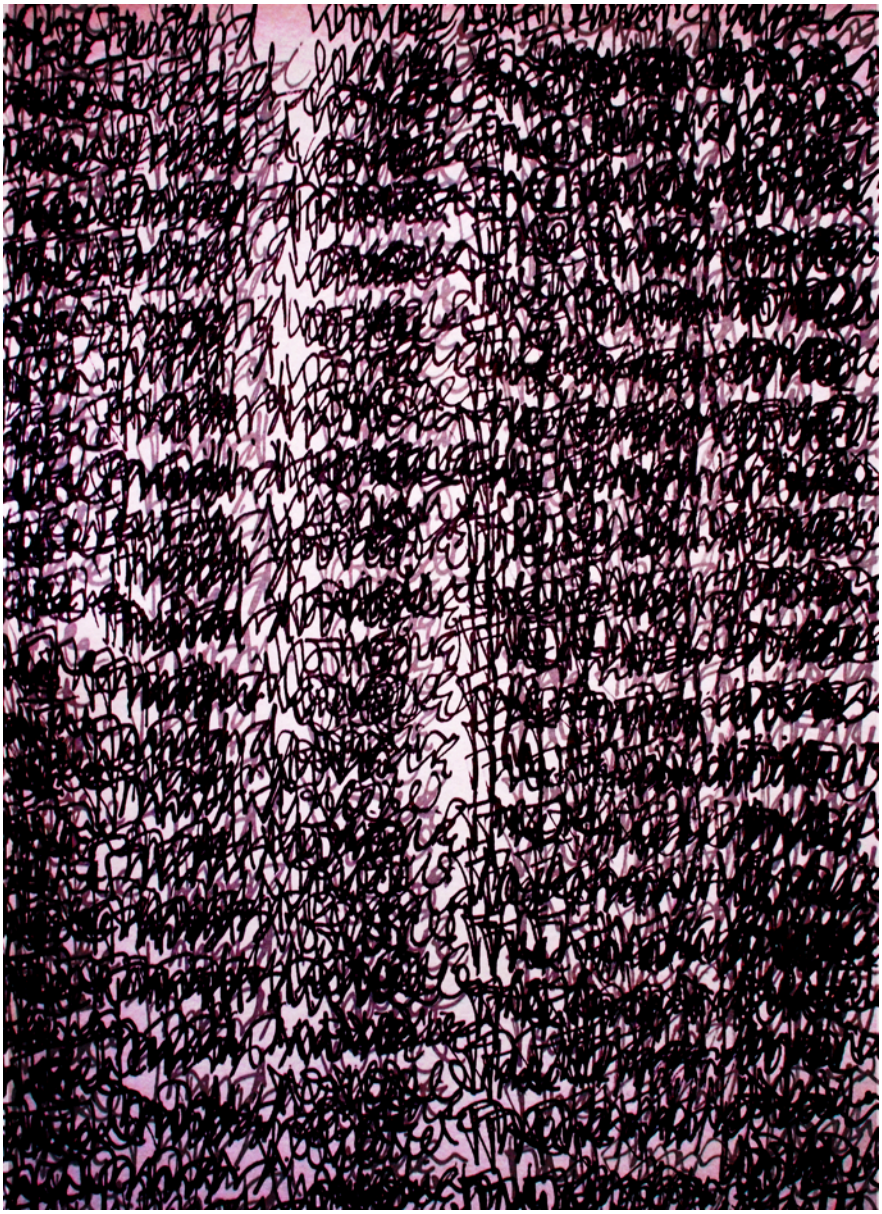


Figure 59 | Text 'the third voice' written over and over again. The act of writing a word or a phrase repeatedly has a similar effect as semantic satiation, one of dissociation, disorientation and fragmentation. Repetitive drawing (Barbara Ellison 2013) |

Interestingly, when 'semantic satiation', normally confined to language, is brought into an aesthetic / musical realm, the dissipation of (semantic) meaning can give rise subsequently –and somehow paradoxically– to a new meaning that is relative to this new cultural frame of reference. This is what happens with the eventual 'musicalisation' of those intensely repeated language elements that have already lost its original, usual meaning. Processes of 'semantisation', therefore, not only take place when abstract sounds turn into words –as in EVP and in my 'Drawing Phantoms' pieces (OVP)– but also when sounds that have been abstracted from language turn into music.

In the 'Vocal Phantoms' pieces I use hyper-repetition of speech sonic patterns in various combinations to, among other things, perceptually shift our attention to semantically-hidden timbral

aspects of the sounds; sonic perceptual layers of the sounds that under normal –linguistic– listening conditions we would not be able to hear. In this way, we switch to listening modes that actively attend to the timbral and sensory qualities of the sound; sonic textures, tones, melodies, rhythms that we never heard before. Music that we had not heard before, coming from 'inside' those words.

A particularly relevant version of this 'musicalisation' takes place in some of my 'VP-TTS' pieces, in which I used computer TTS voices from different nationalities. These options for the choice of voice in TTS software (with personalised names like 'Alva', 'Kyoko' or 'Esther') are obviously provided to render a naturalised voice result when using the right match of language between written text and spoken voice. Under a musical prism and with a playful attitude, it was just a natural step for me to experiment with the tempting mismatches between both: I could get Alva from Sweden to 'speak' Hungarian words; Kyoko from Japan tried her best to make sense of English; Esther from Hungary seemed to make some sort of sense from any language.[AV25, AV27] Besides the obvious plethora of potentially comical results, what these chimerical experiments reveal, and what the resulting pieces abound with, is the immense musicality of language prosody beyond what is normally perceived. I have freely used all imaginable combinations of languages, voices, meaningful text and nonsensical fragments to generate very specific types of musicality, of course aimed at inducing sonic phantoms. In many cases, the illusions are the result of apparent meaning, either temporary or persistent, when the listener thinks he/she can recognise certain words –or is trying to do so– and is therefore very actively and acutely exploring the voice patterns and all their sonic intricacies in search of possible meaning.

This particular acute state of listening combined with the effects of repetition was investigated by the scientist John C. Lilly in a famous experiment involving what he called 'the repeating word effect' (Lilly 1985, pp.64–68). In this experiment he made an extensive study exposing over 300 subjects to a recording of the repeated word 'cogitate' (as a sort of tribute for this, I have created a piece that represents my own version of this experiment [AV43, AV44,]). Results showed that if participants listened to the word 'cogitate' for fifteen minutes or more (they tested durations up to six hours) then they heard on average twenty to thirty different words (other than the one repeated in the recording). The listeners were requested to 'notate changes' in sounds and meanings of what they 'heard'(Lilly - Only the best CD's website, n.d.). From the 300 experiment subjects they collectively notated 2,300 different words, 300 of which were dictionary words and the rest were not.

Writer Edward Rosenfeld participated in the experiment himself and reported:

> 'After a few minutes I became tense and nervous,' recalls Ed, 'I was tired of listening to the same word over and over. Suddenly the tape changed. It said, 'MELT INTO IT.' After

> the tape was over, Ed turned to a friend to compare notes. ‘Tape changed, didn’t it?’ he said. ‘It sure did,’ said his friend, ‘It changed from saying 'COGITATE' to 'COUNT TO TEN.'’ It turned out that everyone in the room heard the tape change to a different word or phrase, and all were convinced that the change was actually on the tape and not in their brains. However, the tape had never actually said anything other than ‘COGITATE.’ These auditory hallucinations are the brain's natural response to a boring, repetitive stimulus, according to Lilly. (Rosenfeld 1973, p.246; Hooper & Teresi 1990)

Lilly’s explanation of the phenomenon points to how intolerant our minds are to repetition and so they necessarily will produce an imaginary illusion of change. This could be plainly described as the brain getting ‘bored’ of hearing the same word over and over again; since it does not have to focus on new incoming material –as it normally occurs– attention shifts to a different level of listening. The continuous repetition of the word pattern will remove meaning and reference / symbolism and so we move from hearing in a schema-based process to a more ‘primitive’ mode of listening. We do not hear a ‘word’ but rather a group of sounds, a number of auditory streams with different timbral qualities and rhythms. The word eventually heard as ‘nonsense’ detaches itself from its semantic meaning due to dissociation and it is now reduced to its acoustic nature, where semantics vanish and are replaced by an exaggerated accentuation of the component parts, letters, phonemes, prominent syllabic chunks. This feeling of dissociation can last for a period of time, until context or framework returns the word to its former position.

In the context of auditory stream segregation (see chapter 1), the once coherent auditory stream of the familiar word begins to split into auditory sub-streams that force a focus on a different level of listening. The result is a focusing on the acoustic nature of the sounds, which split and fuse into a variety of distinct sonic streams.

6 *PHANTASMA MUNDANA* or *NATURALIS*
The Realm of Nature

COMPOSITIONAL PROJECT: 'NATURAL PHANTOMS'

6.1 LISTENING AND RECORDING

Figure 60 | Mmabolela Reserve, Limpopo river, South Africa. | I participated in the Sonic Mmabolela residency/workshop conceived and directed by Francisco López, logistics James Webb | November 2013 [Photographs by Barbara Ellison] |

The realm of sonic experience that I have called *Phantasma Mundana* or *Naturalis* encompasses sonic phantom phenomena generated and experienced in nature. It is represented here by a selection of sound recordings and compositions, under the collective title of 'Natural Phantoms', exploring the phantom-producing polyphony of different natural environments. These sound pieces have been created from original source materials recorded in several field recording trips that I carried out, in partnership with sound artist and biologist Francisco López[26], to rainforest and savannah environments in Brazil (2011), Borneo (2012), Cambodia (2013), Australia (2013) and South Africa (2013).

Figure 61 | Danum Valley Rainforest, Sabah, Borneo, Malaysia | Research Team -Francisco López, Barbara Ellison & Francois Ducat-filmmaker | December 2012- January 2013 [Photographs by Barbara Ellison]|

The sonic richness and complexity of these natural environments –a direct consequence of the abundance and diversity of their wildlife– have provided me with an exceptional opportunity to experience and record the emergence of natural phantoms. They have also been inspirational for the creation of transformative pieces from these recordings. The 'Natural Phantoms' series of compositions is the result of a personal fascination with emergent natural sonic patterns, such as the phenomenon of collective displays of 'acoustic synchrony' amongst frogs or insects, and the multi-layered natural 'polyphony' of many wilderness environments, which give rise to natural interlocking sonic tapestries.

Figure 62 | Cardamom Mountains Rainforest, Cambodia. |Research Team -Francisco López & Barbara Ellison | March 2013 [Photographs by Barbara Ellison]|

The particular mediation of current sound recording technology provides some very unusual and captivating listening perspectives that offer enormous potential for working with from a musical or sound art perspective. The technical tools available today (multi-channel arrays, close-up microphones, hydrophones, contact piezo-disks, etc.) allow for a multitude of sonic perspectives that might often be surprisingly different from our normal sonic impression and memory of those environments. In doing so, these tools amply surpass their assumed role as representational devices, to become –especially when we have a musical or artistic vision– means of sonic exploration.

Figure 63 | 'Mamori Sound Project', Mamori Lake, Amazon Rainforest, Brazil. | I participated in a workshop/residency conceived and directed by Francisco López | October 2011 [Photographs by Barbara Ellison]|

These research trips to diverse natural environments have become an integral part of my practice as an artist. I am not simply interested in documenting an environment; instead, I typically embark on a very personal, emotional and artistic exploration that combines extended direct listening immersion with mediated exploration of the intricacies of these sonic environments. Both techniques reveal, in different but I believe complementary ways, levels of sonic multiplicity and complexity that surpass those of a standard sound impression or memory of a place. Through the recording process I can acquire texturally rich sonic materials, which are often inherently ambiguous and that I can later use as sources of 'sonic blotscapes'. Recordings that can typically function as such are those naturally multi-layered with dense and complex sonic structures. They offer a rich potential for me to illuminate, transform and accentuate any apparent or subsumed sonic phantoms in a variety of ways. Later in the studio they serve to activate my imagination as beholder and to offer an intriguing and heightened

listening experience; one that instils and inspires a compositional process born out of the sonic materials themselves.

Figure 64 | Deserts, Rainforests, Australia. Research trip from East to West Australia, crossing the Nullabor plain |Team - Francisco López & Barbara Ellison | August 2013 [Photographs by Barbara Ellison]|

To a mind primed for detecting phantom patterns, the complex intermingling of soundings offers the potential to experience all kinds of phantasmatic sonic delights. Sometimes the sounds naturally emerging from some natural environments can appear to be quite illusory, to generate sonic phantoms in our perception. When these environments have a spectrally broadband quality (i.e., with many simultaneous frequencies) –something not rare in nature– we often have the propensity to detect patterns, voices, whispers, music. We hear voices in the wind, in water, in dense animal choruses. Following the idea from Guthrie (1995) that animism[27] itself is a by-product of perception from the workings of the brain itself, I envision such naturally-induced sonic phantoms as a kind of sonic animism.

> Faces and other human forms seem to pop out at us on all sides. Chance images in clouds, in landforms and in inkblots present eyes, profiles or whole figures. Voices murmur or whisper in wind and waves. We see the world not only as alive but also as humanlike. Anthropomorphism pervades our thought and action. (Guthrie 1995, p.62)

6.2 NATURAL POLYPHONY

Beyond the usual perception of isolated animal calls, and also beyond the prototypical birdsong 'dawn choruses', many natural sound environments pulsate with an astonishing variety of combinations of simple component structures that give rise to emergent sonic textures and larger scale forms. Besides commonly appreciated qualities of 'beauty' or complexity of individual animal calls (which I

recognise and appreciate), wilderness environments offer –perhaps less obviously–formidable collections of complex natural self-organised structural patterns, which are often interestingly based on very uncomplicated individual elements.

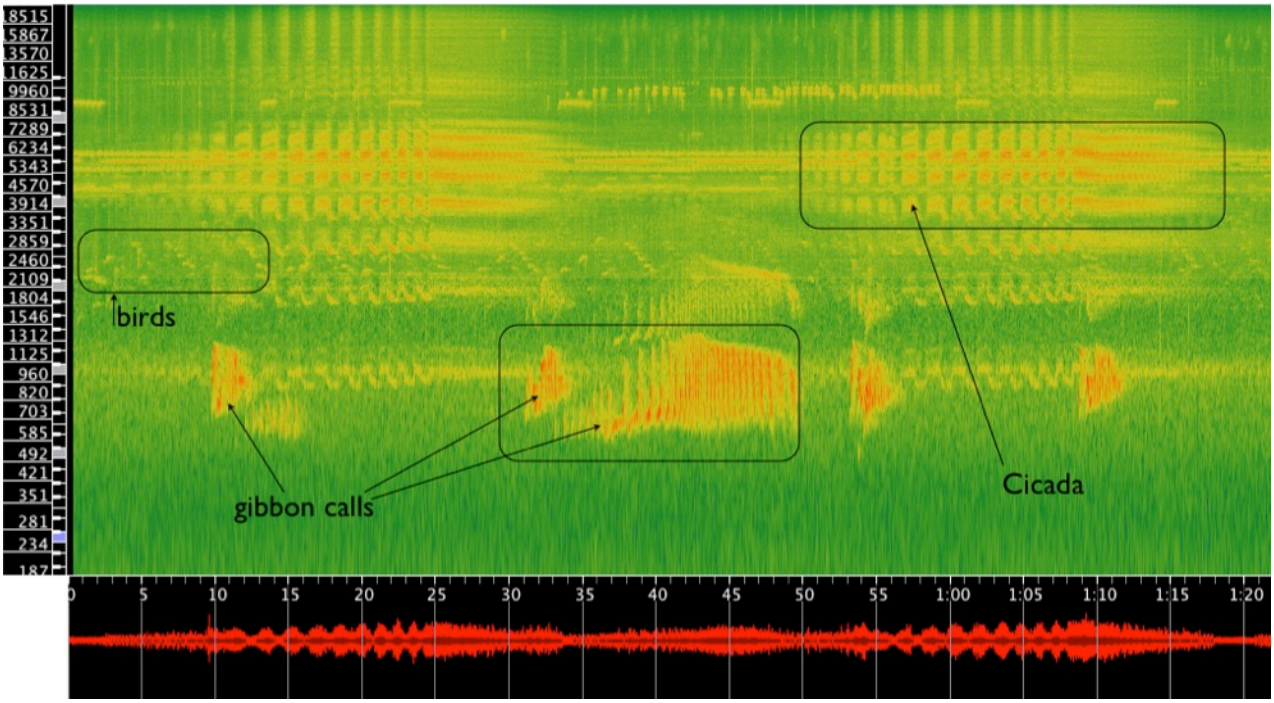


Figure 65 | Example of the simultaneous multiplicity and structural patterns of animal calls in a rainforest at dawn (from my own field recordings in Danum Valley, Borneo, Malaysia). Spectrogram (with waveform below); X-axis: time scale in seconds and minutes: seconds; Y-axis: frequency in Hz, logarithmic scale | [AV50

Like hocketing instruments or voices, relatively simple patterns of alternation between sounding and silence of individual frogs or insects, for example, can typically give rise to the most densely interwoven textured polyphony. Between randomness and regularity, between species-specific features and the pressures of competition between calling neighbours, a multiplicity of parts –sometimes in astounding numbers– contribute to the whole, to the overall *Gestalt* we can identify as potential generator of sonic phantoms. This 'polyphony', therefore, does not refer to the simple presence of different natural 'voices' –animal calls– in an environment (which seems to me more of a metaphorical use of the term), but rather attends specifically to the emergent character of rhythmic patterns, harmonies, sonic textures and timbres. When we listen to them with such a musical ear, natural sound environments are composed of a multitude of simultaneous looping cycles, persistent repetitive structures, oscillating and alternating between sounding and silence, and continually shifting in their figure-to-ground motion, with sounds rising fleetingly to our foreground of awareness, then receding back into the background flux, and so on.

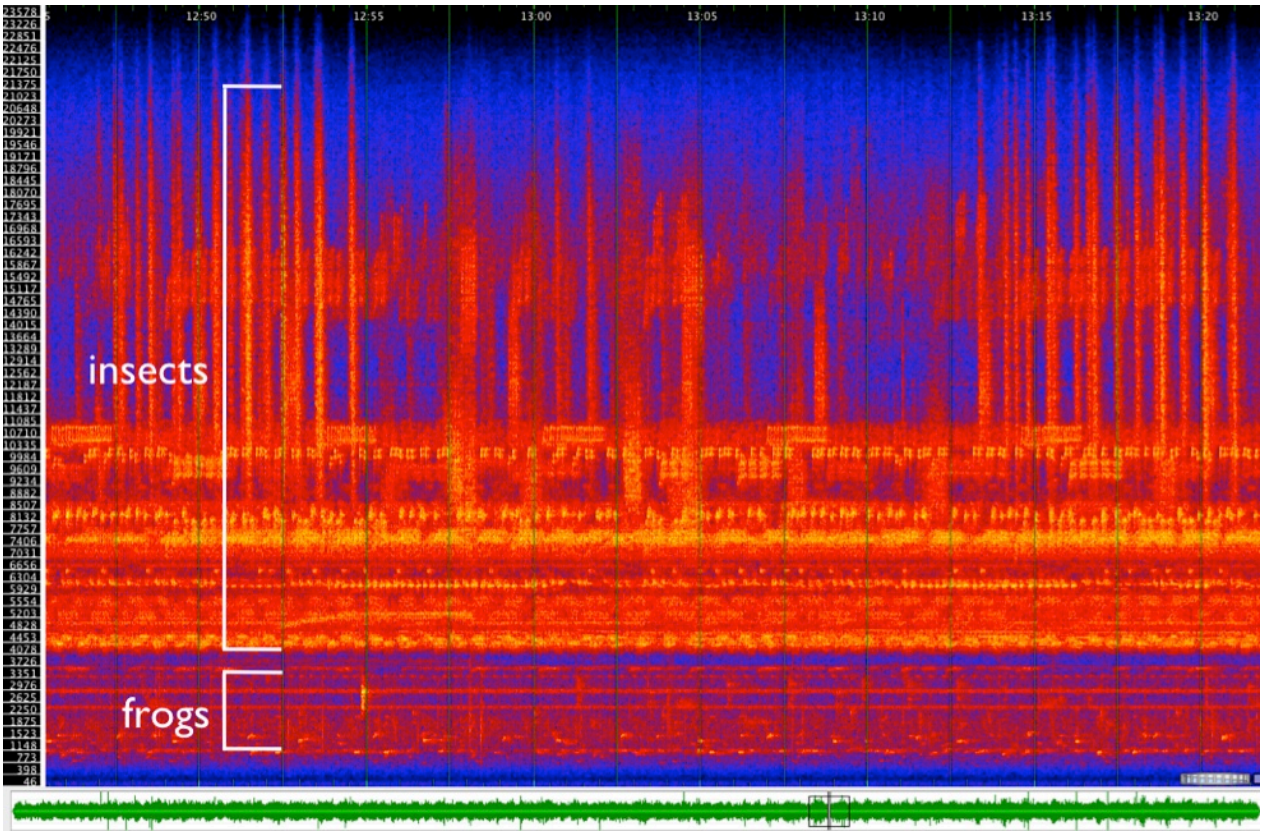


Figure 66 | Natural 'polyphony' in the dense multi-layered sonic environment of a rainforest at night (from my own field recordings in Danum Valley, Borneo, Malaysia). Spectrogram (with waveform below); X-axis: time scale in minutes: seconds; Y-axis: frequency in Hz, linear scale (range reaching slightly above human audible range) | [AV52]

6.2.1 Layering

As a fundamental feature of this polyphony, the multi-layered structure of natural environments has a clear natural expression in the partitioning of the frequency spectrum between different species or groups of species. Similarly to the organisation of radio stations in different broadcasting frequencies, animal calls appear typically organised in different bands of the frequency spectrum (including beyond the upper limit of the human audible range, since many creatures, like bats, dolphins and insects, communicate well beyond our hearing limit). For example, in one of the night recordings I did in the Borneo rainforest (figure 55), which is representative of a typical late night in that forest, there is a clear division between the two main groups of animals that fill up the sonic environment: several species of frogs in the lower part, between approximately 700Hz and 4kHz, and different species of insects (crickets, cicadas, grasshoppers, katydids), from 4kHz all the way up to the upper limit of the human audible range (in this case also coincidental with the limit of the recording range of the microphone equipment used). Within these two main sectors, individual species or sub-groups of

species are in turn further differentiated with their specific frequency bands, sometimes very narrowly, offering a spectral appearance of intense horizontal thin strips.

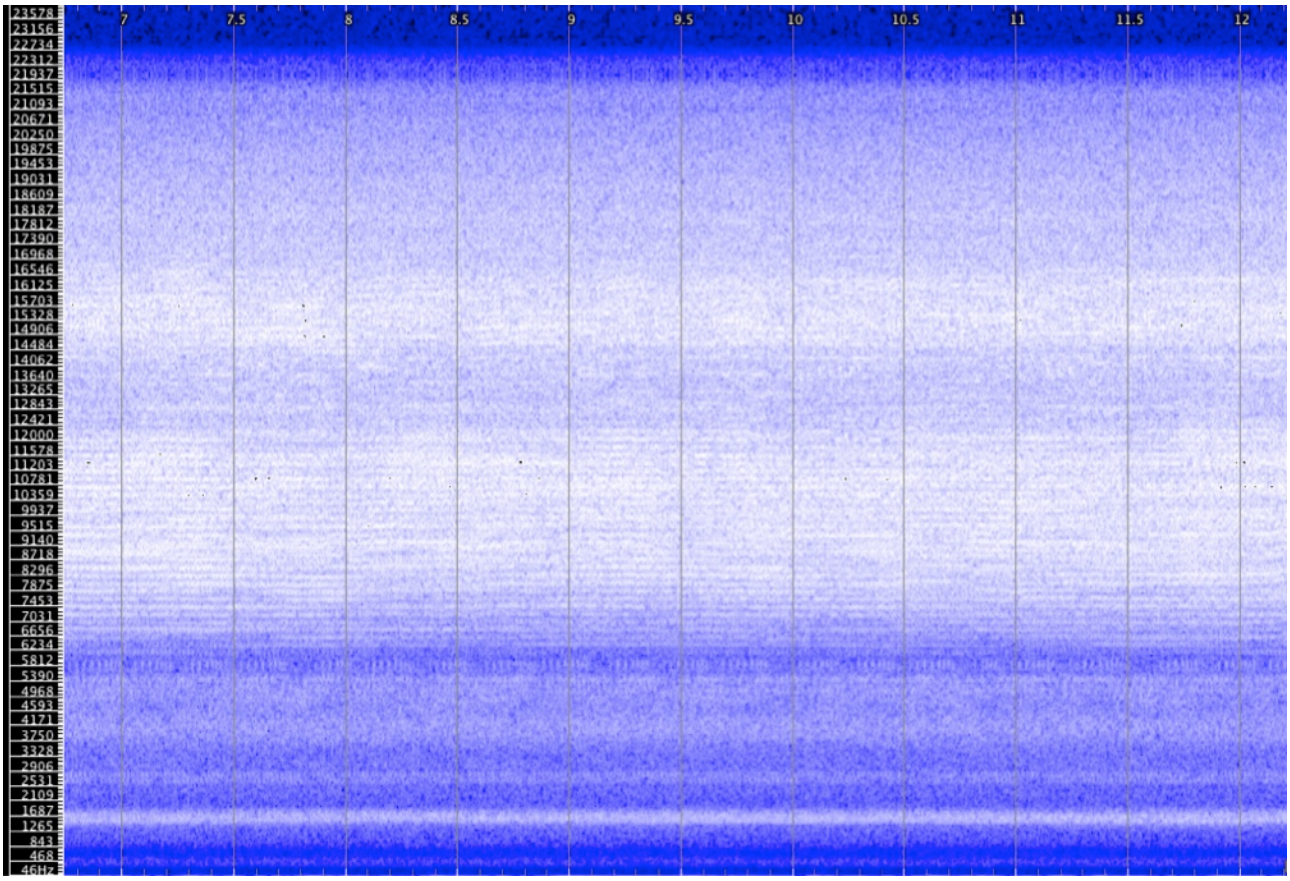


Figure 67 | Conspicuously layered structure of a nocturnal savannah sound environment, with all the frequency bands occupied by insects: crickets, grasshoppers and katydids (from my own field recordings in Mmabolela, South Africa). Spectrogram; X-axis: time scale in seconds; Y-axis: frequency in Hz, linear scale (range reaching slightly above human audible range) | [AV113]

The explanation of this remarkable partitioning of the audible spectrum is fundamentally the same for radio stations and animal species: to avoid the overlap in communication channels and thus minimise interference (McGregor 2005; Hulse 1990). This phenomenon is widely known in bioacoustics and was described by natural recordist Bernie Krause decades ago (Krause 1987) within a field recording / musical context. The bio-acoustic natural organisation is explained by 'acoustic niche theory', a variant of the more general and encompassing ecological niche theory (Levin et al. 2009), which covers the field of ecology that analyses competition for resources between individuals and species, as well as its spatial, temporal and evolutionary consequences. Briefly, acoustic niche theory hypothesises that the sound spectrum is a limited resource over which sound-producing species compete. Therefore, species evolve to partition the sound spectrum in a way that minimises acoustic competition (Levin et al. 2009, Ravenscraft n.d.). In acoustically dense natural environments, there

will be strong pressure on the sound-making species to maximise the effectiveness of their calls by partitioning them within the acoustic landscape, to have their own acoustic niche and thus minimise the degree of interference by masking. In order to be heard, within specific ranges of possibilities for biological mechanisms to produce (and hear) sound, each species has evolved and adapted its own acoustic stream or niche within the spectral structure of any natural environment.

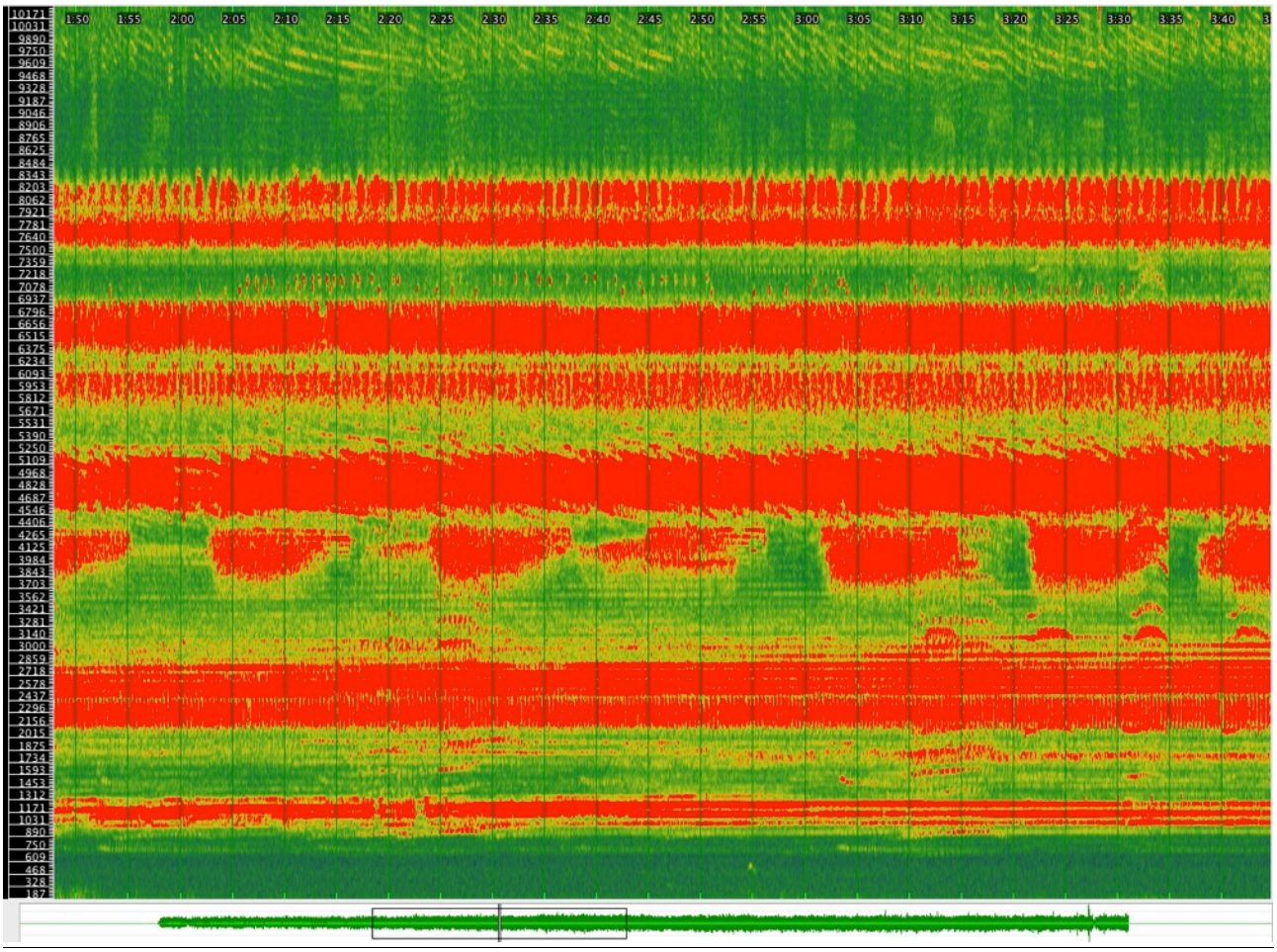


Figure 57 | Another example of clearly layered structure in a rainforest at dusk. All the sound layers are produced by different species of cicadas and crickets (from my own field recordings in Danum Valley, Borneo, Malaysia). Spectrogram (with waveform below); X-axis: time scale in minutes: seconds; Y-axis: frequency in Hz, linear scale | [AV51]

6.2.2 Interlocking

In addition to the spectral organisation, natural polyphony is also built from an acoustic temporal partitioning. As can be clearly seen in the previous figures, whilst some species produce continuous sound (mostly insects), others have clearly fragmented calls. The most common and predominant example in many environments is the sounds of frogs and toads; they whistle, toot and hoot, making interlocking calls that are short and separated. Given the considerable overlap in their frequency ranges, their evolutionarily-selected vocalising strategy is to alternate their sounds and this is what gives rise to their intricate interlocked polyrhythmic textures. The complex overlapping and

interlocking rhythmic patterns allow both each individual frog and the entire emergent chorus to be heard simultaneously.

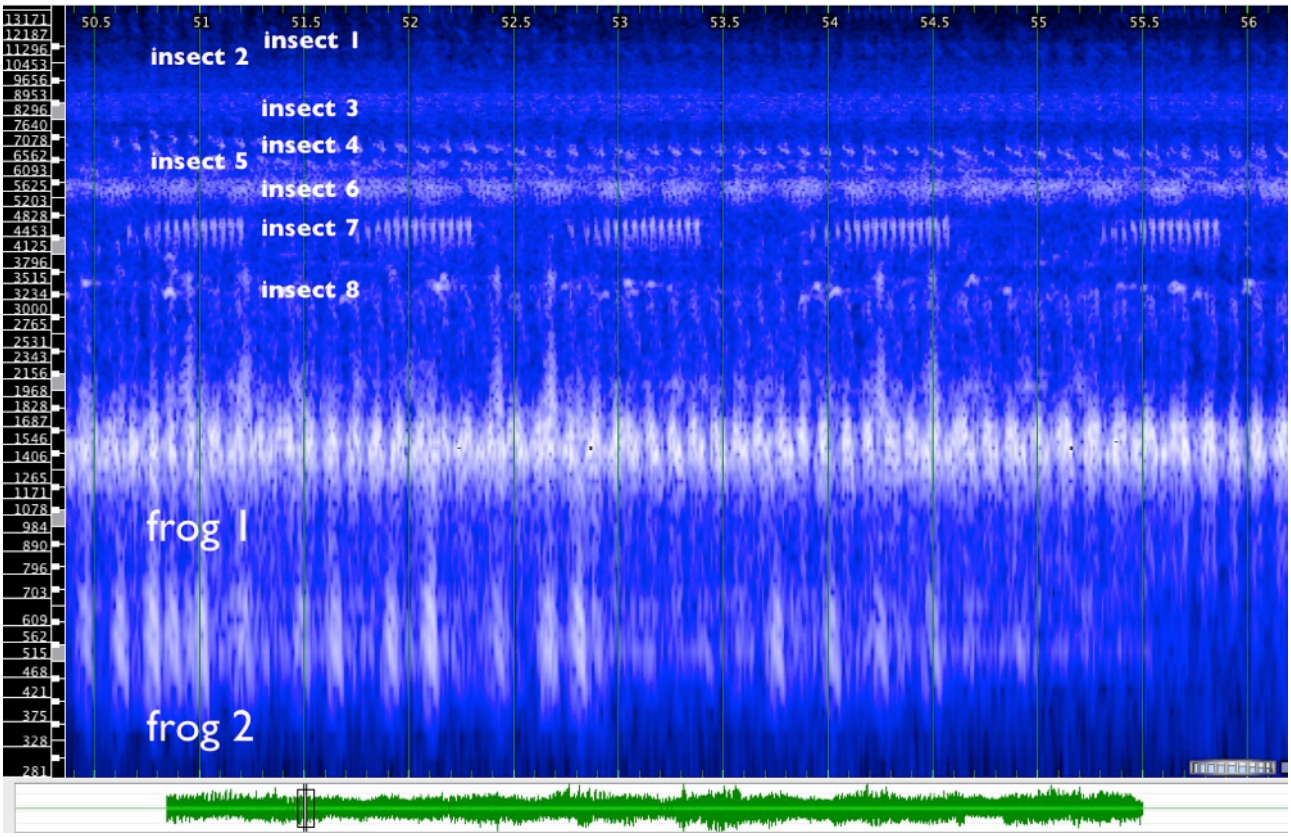


Figure 68 | Interlocking patterns of frogs and insects in a rainforest environment at night, (from my own field recordings in the Cardamom Mountains rainforest, Cambodia). Spectrogram (with waveform below); X-axis: time scale in seconds; Y-axis: frequency in Hz, logarithmic scale | [AV53]

In the constantly changing natural sound environments, sound events have their structured timeline but rarely synchronise or 'keep together in time' (Mc Neill 1995). The phenomenon of perceiving and synchronising to a guiding pulse / beat, and thus coordinating actions, is very rare amongst animals and in general is considered to be unique to *Homo sapiens* (Wallin et al. 2000, Greenfield & Schul 2008). Albeit rare, however, some animals, like frogs and insects, do demonstrate an intricate combination of acoustic alternation and synchronous behaviour, which biologists have termed 'acoustic synchrony' or 'synchronous chorusing' (Walker 1969). This term refers not just to signals in unison, but rather to a complex mixture of synchronous and precisely asynchronous signals. Collective patterns generated by large groups of frogs and insects show a sophisticated resulting structure with correlation in both speed and phase of the rhythms of neighboring signalers (Greenfield & Schul 2008). This is considered partly an epiphenomenon and partly a consequence of some

individual reactions, with multiple simultaneous combinations of both synchronised and alternating calls, from neighbouring competing individuals.

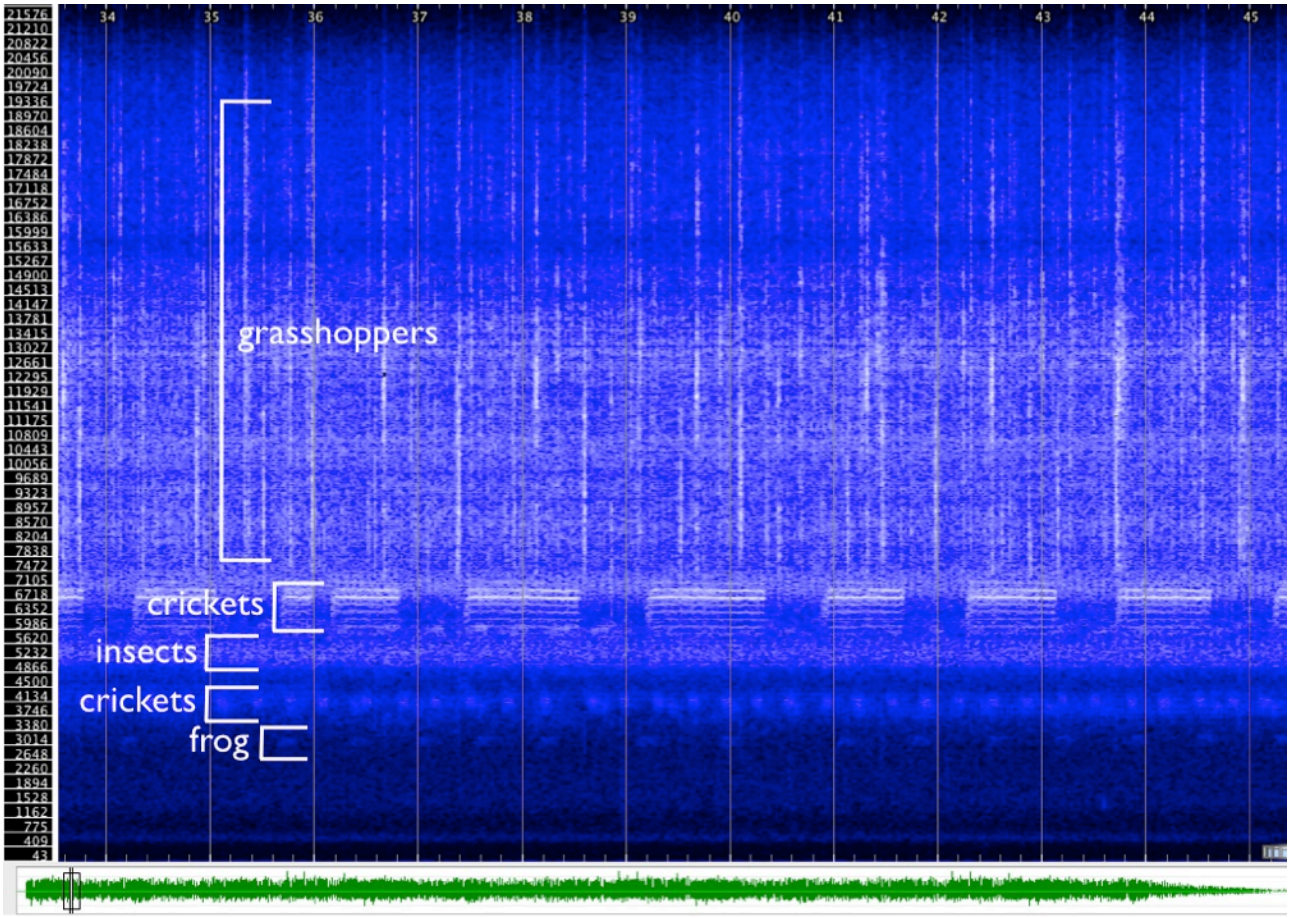


Figure 69 | Interlocking patterns of insects in a rainforest environment at night, (from my own field recordings in Mamori Lake, Amazon, Brazil). Spectrogram (with waveform below); X-axis: time scale in seconds; Y-axis: frequency in Hz, linear scale (range reaching slightly above human audible range) | [AV114]

From an artistic or musical perspective, these collective interlocking patterns, with their polyrhythmic structures, appear as highly structured and densely interwoven sound environments; striking examples of what many would consider as 'natural compositions'. For some musicians and composers it would be perhaps difficult to resist the temptation of seeing spectrograms with interlocking patterns like the ones in the figures above as directly equivalent to scores. Without going into the age-long debate of whether or not these, or any other natural, non-anthropogenic sound constructions are music (see, e.g., López 1998, Rothenberg 2005, Weiss 2008) –or in what sense or under which conditions they could be music– my perception and my approach in working with them is certainly musical in the strongest sense of the term. These natural interlocking patterns have become

the direct source or the structural and harmonic inspiration of my 'Natural Phantoms' compositions, in some cases with very little or no manipulation at all of the original patterns.

There is also an additional inherent component of the natural interlocking patterns that can only be fully appreciated in its sonic / musical characteristics under deeper scrutiny: the micro-timbral structure of the apparently simple individual calls. As would happen with short instrumental percussive sounds, a detailed spectral observation of isolated calls reveals the micro-structural complexity that produces their timbre or tone. Figure 60 shows different examples of micro-timbral structures of frogs and insect calls I recorded in natural environments.

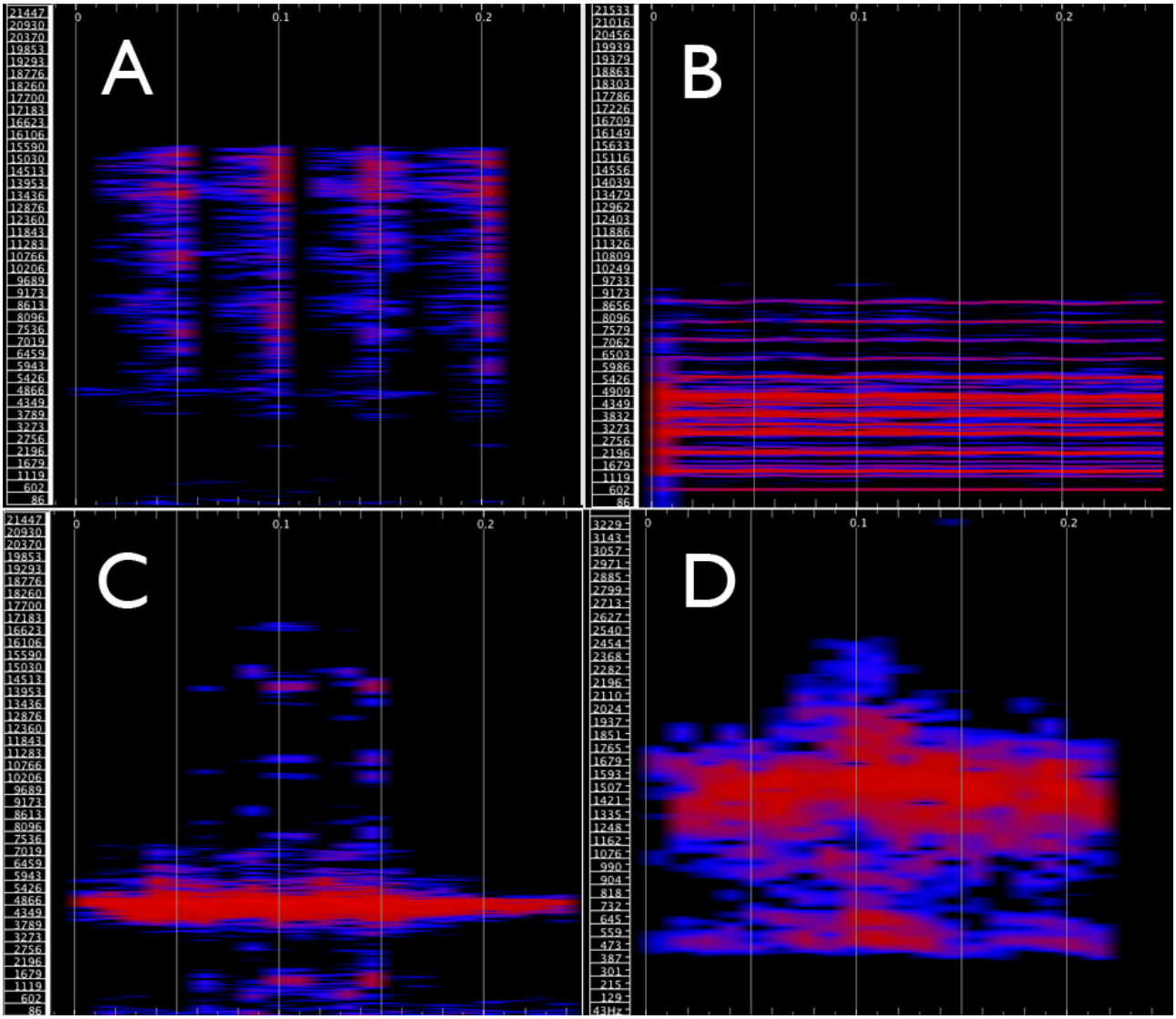


Figure 70| Examples of micro-timbral structure in several isolated individual calls (from my own field recordings in Danum Valley, Borneo, Malaysia; Mamori Lake, Amazon, Brazil; and Cardamom rainforest, Cambodia). A: Grasshopper [AV47]; B: Cicada [AV48]; C: Cricket [AV45]; D: Frog [AV46]. Spectrograms; X-axis: time scale in fractions of seconds (all images cover 250ms); Y-axis: frequency in Hz, linear scale; all insects with same scale, covering the human audible range 20Hz to 20kHz; frog scale range 20Hz to 3kHz |

A closer inspection at this range of temporal scales shows how micro-temporal sound-producing mechanisms, like stridulation (rubbing together body parts; in crickets and grasshoppers), tymbalisation[28] (resonance of body cavities with ultra-fast muscle contractions; in cicadas) and periodic amplitude modulation (vibration of the glottis membrane; in frogs and toads), produce the astonishing variety of acoustic signals produced by insects and frogs; whistles, clicks, croaks, chirps, trills, electronic-like and noise-like soundings, etc. This micro-timbral component becomes audible and more relevant in the case of transformative use of recordings for compositions, if any form of processing is used –as I did in some of my 'Natural Phantoms' compositions– that will pitch down (frequency transposition) or time-stretch small sections of recordings with interlocking patterns.

6.2.3 Transitions

While the detailed timbral structure of animal calls can be seen as a micro-temporal level of natural polyphony (on the scale of fractions of a second), and both layering and interlocking patterns would constitute its meso-temporal structural features (best appreciated at ranges between seconds and a few minutes), there is another level that would represent a relative macro-temporal level of natural polyphony: the slow transitions and crossfades among different species caused by their periods of activity, which take place over periods of many minutes to hours.

All natural environments have these activity transitions –daily sequences of temporal niches for different species– with their corresponding sonic manifestations. They are predominantly slow-paced, with intricate, progressive, morphing transformations, and can only be appreciated at temporal scales that largely exceed any normal experience of attentive listening or recording. Using the analogy of a common popular audio concept, these transitions are ever-changing 'mega-mixes' of shifting layering and interlocking patterns, slowly transforming during and in-between the different phases of the daily rhythms, from dawn to dusk and overnight to start again, in a dynamic circadian polyphony that will gradually change between the seasons in each given environment.

From the different natural environments that I had the opportunity to experience and record, one of the richest, most complex and dramatic examples of these macro-temporal patterns is the dusk transition of the Borneo rainforest in Danum Valley. It kicks off every evening with incredible precision at six o'clock, with the spectacular repeated loud calls of the 'trumpet' cicada (*Megapomponia imperatoria*), also known –for obvious reasons– as the 'six o'clock cicada'. The first

30-45 minutes or so are dominated by the sounds of different cicadas (for a detailed description of the circadian rhythms of cicadas in this ecosystem, see Gogala & Riede 1995).

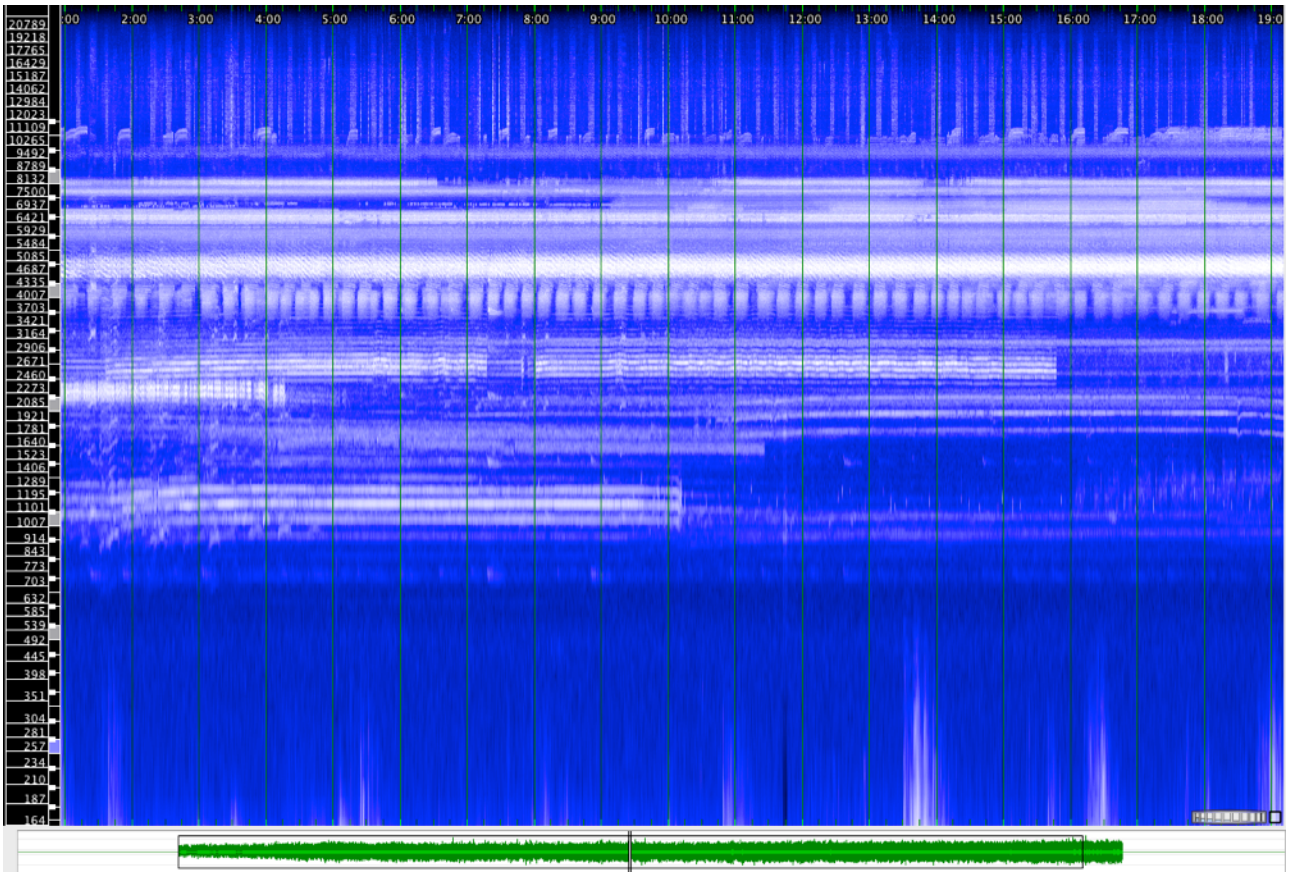


Figure 71 | Multi-layered dusk transition of different species of insects (all the horizontal bands in this image) in a rainforest at dusk (from my own field recordings in Danum Valley, Borneo, Malaysia). Spectrogram (with waveform below); X-axis: time scale in minutes; Y-axis: frequency in Hz, linear scale | [AV51] |

Around 7pm, the activity of the cicadas cross-fades with an intense long crescendo generated by different layers of insects (crickets, grasshoppers, katydids) all across the higher part of the frequency spectrum, later modified again by the incorporation of frogs. It constitutes a continual fortissimo broadband sonic broadcast. Textures and sound events, literally like multiple-layered tracks in a large multi-track sound composition, fade in and out, are switched on and off, according to a precise time line for the dusk transition. Spatially too, sounds are moving all around (many insects, including the 'trumpet' cicadas, fly from tree to tree) and there is a vertical stratification, as most cicadas and katydids sing high up in the canopy, whereas frogs and crickets are singing mostly at ground level. Sonically it is an overwhelmingly powerful experience and one that induces sonic phantoms of the most strange nature, due to the pulsating, beating, hocketing, droning, buzzing and tooting of the dusk 'performers'.

Everything in the environment becomes mixed into this very densely layered performance. Layers are segregated and juxtaposed in time, sometimes by surprising violent contrast, sometimes more subtly with overlap, fading in and out, fusing together and then splitting apart to stand out momentarily in the foreground, then just as quickly receding to a background plane, overlapped or masked by a another sound; a slow metamorphosis from one state to another.

6.3 'NATURAL PHANTOMS'

The compositions in the 'Natural Phantoms' series have been directly inspired by the listening and recording experience in the wilderness environments mentioned above. Moreover, in terms of source materials, all of them were created using the field recordings made on those trips as the sole sonic elements for the pieces. In spite of considerable amounts of studio work, all of these compositions are pervaded by a sense of 'naturalness' that is the result of a forceful attempt at clearly reflecting the 'feel' of that natural polyphony, by keeping intact a significant proportion of its natural structures and timbral features.

In the 'Natural Phantoms' series I have worked in a very intuitive way, letting the materials – and my listening memory of the environments where they came from– guide a process of semi-automatic composition in terms of editing, processing, enhancing, accentuating, combining, mixing, etc. I perceive this as a subtle intervention –at times even perhaps 'interaction'– that has always tried to be sensitive and responsive to the sonic nature of the materials and their structure. All the fundamental features of the natural polyphony –micro-timbre, layering, interlocking, transitions– have a natural 'phantasmatic-inducing' power, exerted through their characteristics of repetition, persistence, noise, sonic blend of different elements, etc. My search and induction of sonic phantoms in this case has been therefore particularly dependent upon the actual natural materials and their organisation; the very compositional framework and development of the 'Natural Phantoms' pieces derive from those natural features.

In this series of compositions I have considered and explored all the temporal levels mentioned above: micro-, meso- and macro-temporal. They also encompass a wide spectrum of studio electroacoustic intervention on the actual materials, from 'straight' field recordings to heavily processed or re-organised recordings. 'Natural Phantoms' pieces #2 to #7, made of recordings from Borneo, Cambodia and Australia of rainforests, represent examples of the first category, with relatively subtle accentuation work carried out –to enhance and heighten the inherent phantasmatic

nature of the sounds– through elaborate detailed equalisation and occasional and selective gain enveloping. At the opposing end of the spectrum would be 'Natural Phantoms #1', with a significant use of transpositions that bring out micro-timbral elements, turning them into structural features.

Combining several simultaneous strategies, 'Natural Phantoms #10' uses extreme accentuation and transposition of individual layers that are subsequentially combined with their non-transposed couples in variable combinations, as well as mixed and organised in time following an inspiration from natural transitions between layers.

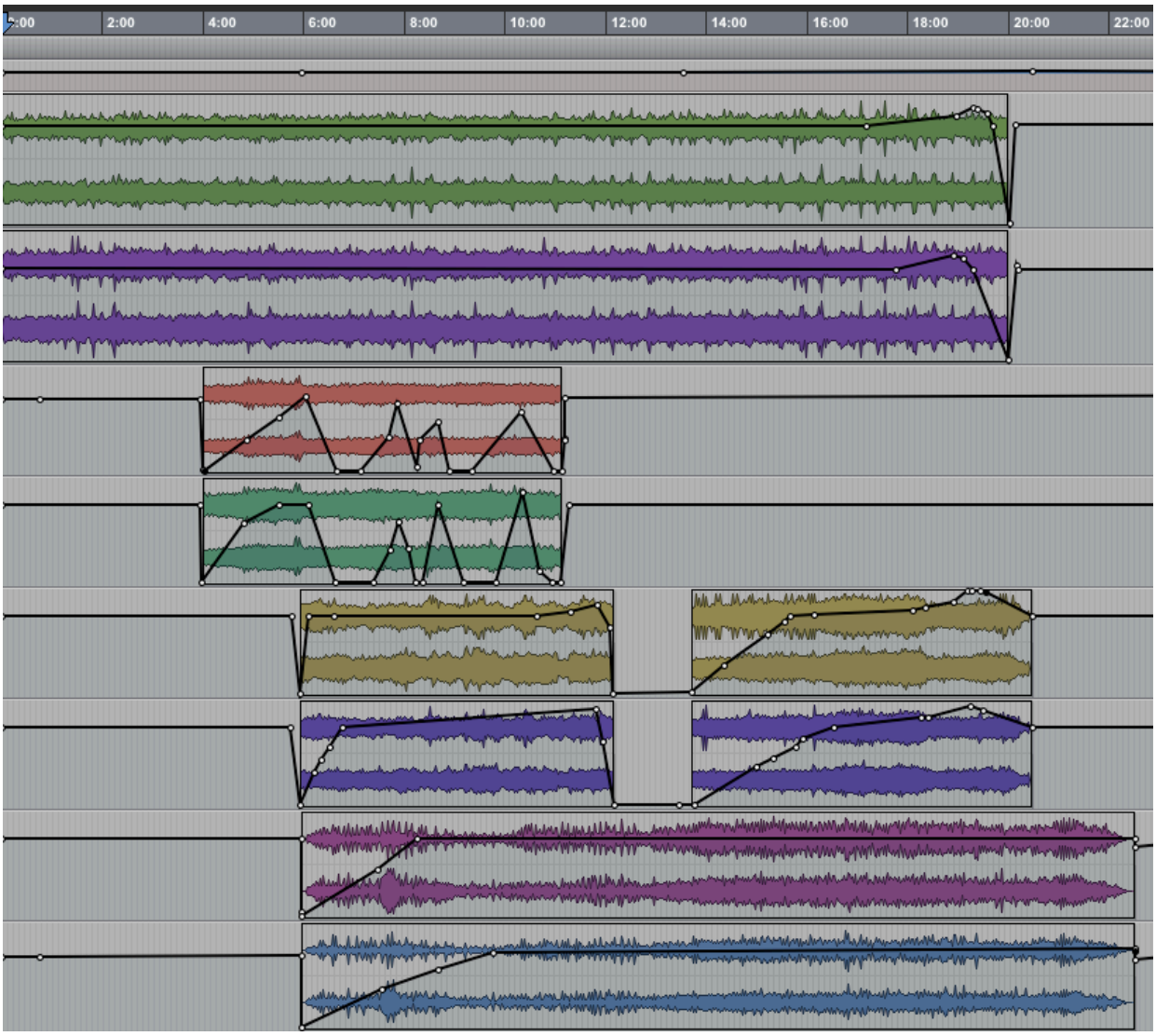


Figure 72 | Waveform nnd volume diagram of 'Natural Phantoms #10'[AV58] in ProTools editing-mixing software (timeline in minutes). Coupled stereo files are combinations of transposed and non-transposed recordings |

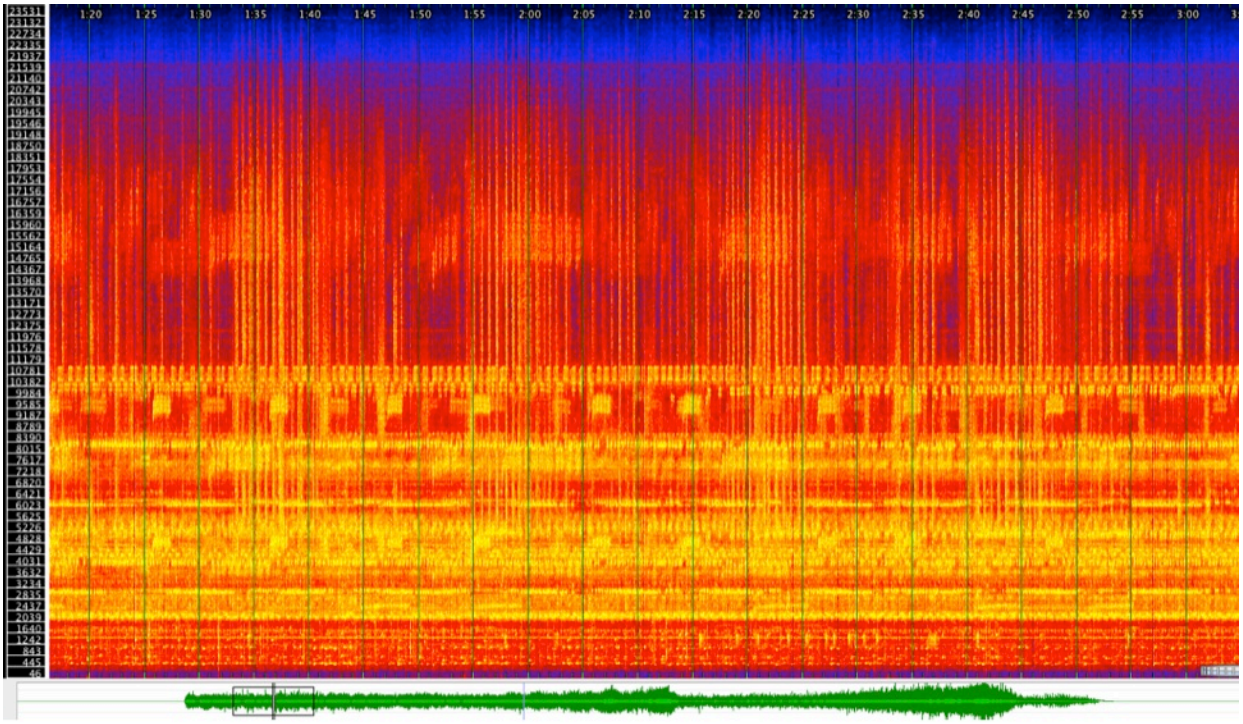


Figure 73 | Spectrogram of a section (indicated in waveform below) of 'Natural Phantoms #10',[AV58] in ; X-axis: time scale in minutes; Y-axis: frequency in Hz, linear scale (range reaching slightly above human audible range) |

Finally, 'Natural Phantoms #9', created mostly from underwater recordings of insects and fish that I carried out in Mmabolela (South Africa), was composed and constructed with extensive editing, giving rise to a multitude of fragments that were re-combined and mixed in a 38-channel structure. Many of the original sounds –all of them from fish and underwater insects– were kept intact in this structure, as well as their natural interlocking organisation. Others were modified by different transpositions, and new interlocking and transitional formations were engineered from the intricate combination of all the layers. A further element for the induction of sonic phantoms in this piece was the deliberate raising of the noise level in some of the recordings.

Figure 74 | Waveform diagrams of 'Natural Phantoms #09'[AV57] in ProTools editing-mixing software at increasing temporal scales (from top to bottom), showing multi-track, transition and interlocking patterns (timeline in minutes: seconds)

7 CONCLUSIONS

1. By means of the collection of pieces created and the research and contextualisation presented, my work with 'Sonic Phantoms' aims at bringing into focus, shaping and defining a specific and dedicated compositional realm that considers auditory illusions as essential components of the work and not simply mere side effects.
2. The compositional part of this Ph.D. comprises fifty-eight pieces, structured in four separate collections / series. All of these compositions have been internationally performed in public, both live and in radio broadcasts, and this involved the development of specific and elaborated performance settings, as well as my own participation as a performer.
3. Both my compositions and research work integrate and synergise a considerable number of disparate musical traditions (Western and non-Western), techno-historical moments (from ancient / archaic to electronic / computer-age techniques), cultural frameworks (from 'serious' to 'popular'), and fields of interest / expertise (from the psychological to the musical), into a personal and cohesive compositional whole. All these diverse elements are not simply mentioned or referenced, but have rather defined, structured and formed the resulting compositional work.
4. For the creation of the compositional body of work 'Sonic Phantoms', I have developed a syncretic approach that encompasses and coalesces all kinds of sources, materials, techniques and compositional tools: voices (real and synthetic), field recordings (involving wilderness expeditions worldwide), instrument manipulation (including novel ways of 'preparation'), object contact-microphone amplification, improvisation and recording studio techniques, among others. This manifests a 'sonic-based' and 'perceptive-based' understanding of the compositional work, as an implicitly proposed paradigm for any equivalent work in terms of its trans-technological, phenomena-based nature.
5. As a direct result of the exploration of this multiplicity in both diverse musical practices and in my own experience with the different ways to compositionally work with these phenomena, I have identified and described what I consider to be the fundamental categories of strategies to induce 'Sonic Phantoms': repetition, persistence, layering, noise and accentuation.
6. I have introduced a conceptual framework for the inclusion of all imaginable potential sources of compositional 'Sonic Phantoms'. This system, inspired by the classic division of music categories created by Boethius, proposes four realms of sonic (phantasmatic) experience: *Phantasma Instrumentalis* (relative to instruments), *Phantasma Materialis* (objects as instruments), *Phantasma Humana* (human voice) and *Phantasma Mundana* or *Naturalis* (any sounds from –terrestrial or cosmic– nature). These realms are made explicit to delineate territories of conceivable sonic-compositional exploration and thus to contribute to the expansion of the 'musically possible' besides and beyond the instrumental and the anthropogenic. All of these realms are exemplified by a collection of original sound pieces that I created to illustrate the characteristics and specificities of each one of them.
7. In developing the work of this Ph.D., I have explicitly and structurally incorporated a number of concepts from other disciplines, proposing newly developed or combined terms, as well as novel ones, that identify their integration and significance in the compositional realm: amongst the most relevant, 'Sonic Phantoms', 'phantasmagenics', 'creative apophenia', 'sonic blotscapes' and 'Object Voice Phenomena'.

ENDNOTES

[1] The term is perhaps a misnomer incorrectly attributed to Klaus Conrad by Peter Brugger, who defined it as the 'unmotivated seeing of connections' accompanied by a 'specific experience of an abnormal meaningfulness', but it has come to represent the human tendency to seek patterns in random information in general (such as with gambling), paranormal phenomena, and religion (Conrad 1958; Brugger 2001).

[2] 'For now we see through a glass, darkly; but then face to face: now I know in part; but then shall I know even as also I am known.' (1 Corinthians 13: 12-13)

In this phrase famously written by St. Paul in the bible, the "glass" refers to the mirror of the ancient Roman world. These mirrors were made of highly polished metal, often brass, tin or silver as opposed to the aluminium coated glass of our modern mirrors, glass been in use only since the middle ages. Images in these ancient polished bronze 'mirrors' appeared blurry and ambiguous in comparison to the crisp clear reflection to which we are accustomed to today. Reflections were seen 'darkly' or indistinct, and unclear hence why "we see through the glass darkly".

[3] In this book, also known as the 'Principles of Music', Boethius described the Pythagorean unity of mathematics and music, and discussed the Platonic concept of the relationship between music and society. Music was one of four 'mathematical subjects': arithmetic, geometry, astronomy and music, that will later be at the cornerstone of Renaissance education.

[4] The extraordinary polyphony and specific illusory (e.g Krimanchuli – meaning yodeling Georgian style) techniques of the Georgians brought me into contact with scholar and singer Joseph Jordania who subsequently invited me to Georgia in 2012 where I presented my research at the 6th International Symposium on Traditional Polyphony in Tbilisi and thereafter travelled with Jordania and a wonderful group of Georgian singing choirs from Australia and New Zealand to Svaneti in the remote West of the country to record and learn and immerse myself in Georgian music. It was a total honor to be taught and hosted by some of the most respected giants of the Georgian music world, the legendary Pilpani family. This example (**AV87** -|Anchiskhati choir-chochkhatura-extract) is one I recorded myself on this trip. This antiphonal tour-de-force is a Naduri (Harvest song) from the Guria region and sung by the phenomenal Anchiskhati Choir (Garakanidze & Mills 2004).

[5] Practical research into ritual and performance conducted involved regular workshopping and performances with the 'Trickster' collective of artists (www.tricksterspace.org) of which I am a core member, and also undertaking other workshops including – participation in intense physical theatre workshops in london with Nicolás Núñez, director of the Tailleur de Investigación Teatral in Mexico City, acclaimed author and former collaborator with Jerzy Grotowski, who offers his audiences and workshop participants a pathway to the archetypal world: in his long search for 'cosmic verticality' he has forged a contemporary shamanism (see Brook 1972; Schechner 1988; Núñez 1996; Brook 2001; Rozik 2002) .

[6] Dissanayake theorises from an ethological perspective that, animal ritualisation and rituals in human culture (e.g. in music making) have a common evolutionary origin. That music for example is understood to be a 'behavior' that evolved in ancestral humans because it contributed to their survival and reproductive success (see also Blacking 1976; Drake et al. 2001; Mithen 2007; Brown et al. 2006; Patel 2007).

[7] Unbeknownst at the time to Kubik and far away from field research in Africa, as early as 1950, researchers Miller and Heise were conducting experiments into the streaming phenomenon (Miller and Heise 1950). This type of seminal work promoted the later development of a substantial research focus in the 1970s in investigating parsing mechanisms in auditory perception (Bregman and Campbell 1971; Noorden 1975; Bregman 1991; Brochard, R. et al., 1999). The experiments of Bregman and his collaborators have demonstrated a number of different acoustic dimensions that can be used by perception to group together the components of a complex sound. Extensive tests were carried out under laboratory-controlled conditions with cyclic repetitions of simple-stimulus sequences to analyse the grouping tendencies under certain conditions, as guided by the *Gestalt* laws of organisation (see Bregman 1991).

[8] The Akadinda is a large wooden xylophone played by several musicians at the same time. The resulting music consists of rapidly interlocking patterns of isochronous notes and disjunct intervals firing at about 8.4 tones per second, repeating the same note sequence in cycles for extended periods of time.

[9] Bregman's research into Streaming also shows that we can distinguish between schematic and primitive processes in segregation. Schema based processes are higher-level processes that depend upon knowledge-driven processes, whereas primitive modes of listening are pre-attentive and activate without the mediation of memory and learning. Primitive streaming in perception can be responsible for influencing the segregation of patterns based on factors including frequency separation, dynamic contrast, spacial separation and timbral organisation (see e.g., Bregman 1994; Deutsch 1983;Deutsch 1999; Clarke 1999; Deweese et al. 2005).

[10] In relation to musical patterns in African culture played by lone players (Ennanga, Zither, lamellophone) Kubik writes about how the musician ends up 'reading' messages into the ever changing oscillating patterns.

> 'Inherent patterns create a complex illusion of conversational polyphony, since many of these patterns are verbalized; they say something to the solitary performer and to audiences….quite often oscillating patterns also give composers new textual ideas' (Kubik 2010b, p.139)

[11] In this context my use of the word 'focus', is almost synonymous with 'concentration'.

[12] 'A major advance in interpreting rock art, and in rock art theory and method, was made in the 1980's with the development of David Lewis-Williams and Thomas Dowsons (1988) interdisciplinary neuropsychological model. This is an ethnographically informed "middle range" theory. They proposed that the neuropsychological model, which had been developed in South Africa, could be applied to Upper Paleolithic European rock art. Unlike the discredited idea of "sympathetic hunting magic," which Lewis-Williams argued was based on anthropologists "vague and misguided notions of "primitive mentality" rather than reliable ethnography," the neuropsychological model was an explicitly anthropological model based upon ethnography, medical science, laboratory findings, and Homo sapiens shared neurology (Lewis-Williams 1982:430; 1988: 201-204). As a scientific model it made empirical predictions that could be tested against a rock art site, which gave a means of adjudicating between competing interpretations. Rationalist science and scientific methodology were thus applicable to the study of archaeological cognition. The ethnographically informed interpretation of the San rock paintings as the product of shaman who later depicted their visions and hallucinations during altered states of consciousness (ASC) designed to obtain power, turned out to have unexpectedly broad and global application. Ethnographies from around the world, frequently neglected by archaeologists in the past, now could be seen to refer directly or through metaphorical references to the connection between shaman, vision quests, and rock art' (From Current Trends in Rock Art Theory * Kevin L. Callahan. Anthropology Dept., U of MN. USA)

[13] It is interesting to mention briefly something about ideomotor action theory. This term coined by William Carpenter a physiologist in the mid 1800's and was used to describe how when we expect a movement and we have an idea of it in mind that this expectancy can actually cause our muscles to unconsciously produce the expected movement. This concept was used to explain for example how the Ouija board works and also how automated writing feels like the some external force is driving the movement of the pen.

[14] Tunnel vision is where you lose your peripheral vision but maintain your central vision, resulting in a limited circular tunnel-like field of vision. It happens when we attend so specifically to something that we actively ignore everything else that is happening around us. Neuroscientist's Macknik and Moartinez-Conde explain in their book "sleights of mind' how magicians exploit this propensity of the human brain to maximum effect. In a similar vein. In this book they propose that magicians can also reveal much of interest about neurophysiology. They set forth a neural foundation of magic based on what magicians do in practice. They explain how magicians are masters of attention and cognition manipulation and that neuroscientists can learn a thing or two from them and their magic tricks about the workings of our brains.(Macknik et al. 2011)

[15] Lewis-William's understanding of consciousness is clarified with the metaphor of the 'spectrum' adapting the 'consciousness as spectrum' working model of the cognitive psychologist Colin Martindale (Martindale 1981; Lewis-Williams 2002). This model suggests that we need to think of consciousness as a continuum or spectrum and not a 'state'. Lewis-William's writing on this shifting mercurial consciousness of human beings is controversial but fascinating.

> Consciousness spectrum working model
>
> *According to Martindale as we drift into sleep we pass through,*
> *Waking, problem-oriented thought,*

Realistic fantasy

Autistic fantasy

Reverie

Hypnagogic (falling asleep) states,

Dreaming

Hypnagogic illusions, which occur at the boundary between sleeping and waking (hallucinations)

Lewis-Williams uses this spectrum of different states of consciousness to explain many features specific to Upper Palaeolithic art and discusses two trajectories, which are of interest. The first is the spectrum of consciousness, which we consider to be 'normal consciousness', spanning from shifting wakefulness to sleep (see above). The second is one that passes through the same spectrum but with different effects. Lewis-William's calls this the 'intensified trajectory', which is more inward directed and concerned with fantasy and imagination. The 'intensified trajectory' passes through the same spectrum where dream-like states are reached but without a final result of unconsciousness.

He describes how these dream like/trance states (of the human nervous system) may be induced by a variety of means other than normal drifting to sleep for example sensory deprivation. We have the need for physical and mental stimulation and absence of such will lead to a craving for any stimulus (Lewis-Williams 2002; Lewis-Williams & Pearce 2009a; Lewis-Williams 2010; Bauman 2011). For a discussion relating more specifically to trance states and shamanism see (Eliade 1958; 1964; 1996; Cardeña 1996)

[16] Entrainment is defined as 'a synchronization of two or more rhythmic cycles' and was first discovered by Dutch scientist Christian Huygens in 1665. One of the experiments that led to this discovery was when Huygens set up a room full of pendulum clocks and got them all started one at a time. He found that when he came back to the room a day later, the sway of their pendulums had all synchronized. From this, he extrapolated that entrainment represented a ubiquitous natural phenomenon that had to do with the conservation of during the interaction of closely related rhythmic cycles.

[17] The 'noise floor' is the unwanted noise and signals present or created other then the one that is wanted. It's a common challenge dealing with these 'unwanted' noisy artifacts from radio communication, electrical devices, electromagnetic sources, cellular networks and electronics. Throughout this thesis however, I have proposed that such noise fields can present interesting opportunities for discovering rich sonic sources.

[18] The name for the vocal games in Canada varies with the geography:

Katajjaq or Katadjak – Nunavik and South Baffin
Iirngaaq – some Nunavut communities
Piqqusiraarniq or Pirkusirtuk – Igloolik and Baffin Island
Qiarvaaqtuq– Arviat
Nipaquhiit – some Nunavut communities

[19] In earlier times, the game was played with the women's mouths almost touching, in order to use each other's mouths as resonating cavities, but this is no longer done.

[20] For some pertinent contemporary examples of compositions focused on speech patterns see for example: Paul Lansky's 'Idle Chatter', Steve Reich's 'It's gonna rain', Alvin Lucier's 'I'm sitting in a room'.

[21] Voiced pitch has a periodic fundamental frequency, or is clear sounding pitch as opposed to voiceless pitch, which has no clear sounding fundamental.

[22] This notation I have adapted from a combination of Beaudry and Nattiez's detailed transcriptions and analysis of the Katajjaq (1982,1990).

[23] This can be seen as a very intriguing side effect of the process of auditory stream segregation that takes place in music that exploits perceptual ambiguity.

[24] An illusion worth mentioning is **McGurk effect**. There is a 1978 study by Scottish psychologists Harry McGurk and John MacDonald. They showed volunteers movies of a woman's mouth forming the shape of the sound 'ga' paired with a dubbed sound of 'ba', The volunteers reported hearing 'da', showing for the first time that visual inputs strongly affect speech perception (Mac Donald et al. 1978)

[25] Professor of psychology Richard M. Warren at the University of Wisconsin-Milwaukee conducted perhaps the most in-depth scholarly research into this phenomenon also in the 1960's, which he referred to as 'verbal transformation effect'(see for example Warren 1961) .

[26] Francisco López, director of 'Mamori Sound Project' and 'Sonic Mmabolela', is internationally recognised as one of the major figures of the experimental music and sound art scene. He is also a Ph.D. ecosystems biologist, with more than twenty years of teaching experience in Spain and Latin America.www.franciscolopez.net

[27] Animism according to Guthrie is the attribution of life to something where there is none (Guthrie 1995)

[28] Sound producing system in cicadas consists of two coupled resonators: Firstly, the sound producing tymbal, and secondly, the Helmholtz resonator that consists of the abdominal air sac and tympana. The tymbals produce the sounds, the resonator radiates and amplifies the sounds produced (Bennet-Clark & Young 1992).

Glossary of Terms and Abbreviations

Apophenia

Greek- *APO* (away from) *PHENIA*/*Phren* (mind) - away from the mind.

Apophenia is the spontaneous experience of seeing meaningful patterns or connections in random or meaningless data (or unrelated phenomena). In statistics, apophenia is called a 'Type I error', seeing patterns where none, in fact, exist. It has come to represent the human tendency to seek patterns in random information in general, such as with gambling, seeing forms and faces in natural matter and paranormal phenomena. It is probable that the apparent significance of many unusual experiences and phenomena are due to apophenia, e.g., supernatural experiences, Electronic Voice Perception (EVP), prophecies, and other paranormal phenomena. Apophenia is a commonly experienced phenomenon, but taken to extremes can lead to psychosis or schizophrenia. Apophenia and pareidolia can be conceptualised as a bi-product of the 'hardwiring' of our brains. (Brugger P 2001; Schermer 1996; Shermer 2012b).'Auditory apophenia' can be used to describe apophenia in the auditory domain. Also see '**Pareidolia**'

Auditory Scene Analysis

'Auditory Scene Analysis' (ASA) is a fundamental aspect of hearing and speech perception (Bregman 1994). It describes how the auditory perceptual system analyses and makes sense of a noisy and chaotic complex acoustic world dividing it into individual coherent auditory components or meaningful events of interest. ASA is essentially how we perceptually *group* and *segregate* various sound sources into perceptual and coherent 'streams'. In context of 'Auditory Stream Segregation theory' (see Handel 1989; Bregman 1994) a 'stream' is a psychological organisation that cognitively displays a certain internal consistency, or coherence, that allows it to be interpreted as a 'whole'. When we identify a single speaker in a crowded noisy room we are in fact carrying out auditory scene analysis and identifying the vocal 'stream' belonging to that person.

Auditory Streaming

The 'Auditory Streaming' phenomenon happens when a repeating pattern under the necessary conditions, splits perceptually into two or more sub streams. It is the spontaneous perceptual

oscillation between one aural 'view' and another. 'Auditory Streaming', which has only recently being conceptualized as a perceptual bi-stable phenomenon is the equivalent of visual bistability in audition (Denham, Winkler, 2006).

Creative Apophenia

For me this means the playful creative use of apophenia- our propensity to see and hear forms where there are none- to make interesting work. It's a creative process of connecting dots.

Entrainment

Entrainment is a process where at least two or more autonomous rhythmic processes interact with each other so that they eventually synchronise or 'lock in' to a common phase and/or periodicity (Clayton et al. 2005, p.3). It is defined therefore as a synchronisation of two or more rhythmic processes and was first discovered by Dutch scientist Christian Huygens in 1665 with his experiment of 'the sympathy of clocks' relating to how a room of pendulum clocks after one day has all synchronised (Clayton et al. 2005, p.4). From this, he deduced that entrainment is a pervasive natural phenomenon that had to do with the conservation of energy during the interaction of closely related rhythmic cycles. Examples of entrainment include fireflies illuminating in synchrony, humans adjusting their walking patterns to match each other, brainwaves 'entraining' to certain frequencies etc. (Clayton et al. 2005; Clayton 2012; Turow 2005; Neher 1961).

EVP

Electronic voice phenomena (EVP) are sounds found on electronic recordings, which resemble speech, but are not the result of intentional recording or rendering.[AV106] EVP could be considered an example of Auditory Pareidolia. EVP are commonly found (after hours of listening) in noisy recordings, where the gain of the recording equipment was set to high sensitivity, in addition to any other static, stray radio transmissions and background noise, which may have been picked up (Alcock 2004; Shermer 2002).

Emergent patterns

Emergent patterns are global characteristics or *Gestalts* - perceptual results that are significantly different - arising at a higher level when information (sonic phenomena in this case) at a lower level is organised in a particular way (Bregman 1990). Figure and ground relationships

The ‘figure’, which is in the foreground of perception, stands out against the ‘ground’, experienced as the prominent and coherent object of attention (Neumann et al.1996). The ‘ground’ is what is experienced as the background of perception and constitutes the part of the perceptual image that is not the ‘figure’ where the attention is currently focused. In the visual modality the ‘figure and ground reversal phenomenon’ is well known. Most of us are familiar with reversible images such as this one below. In such an image there are two possible readings. Usually at first glance we can see only one of the two possibilities, which is foremost in our perception. Here sensory input is ambiguous and not only one interpretation. We can read this image as a duck or a rabbit. Both interpretations are equally valid, so it is a perceptual bistable image. Bistability is the blurring of conventional foreground and background relationships.

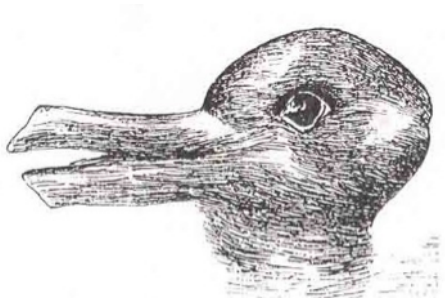


Figure 75 | Bistable image of a rabbit or duck |

This phenomenon comes into being because the two alternative images share a common border. The border can perceptually belong to either the duck or rabbit, but not to both at the same time. At any point in time, the border ‘belongs’ to whatever image is foreground in perception. If the duck image is foregrounded, then the rabbit will assume the ‘ground’ role. However with or without attention one can also alternate to focus on the rabbit image and then the border will now belong to that image. In both cases clear switches in perception are experienced, even though the stimulus does not change.

> '... we can switch from one reading to another with increasing rapidity; we will also 'remember' the rabbit when while we see the duck, but the more closely we watch ourselves, the more certainly will we discover that we cannot experience alternative readings at the same time.' (Gombrich 2000, p.5)

Inherent patterns

Inherent patterns (formally known as subjective patterns), as put forth by Kubik, can be defined as independent melodic-rhythmic phrases that only exist as an aural image and are not played

as such by the performers. He described them as a *Gestalt*-psychological phenomenon caused by a certain structural arrangement of rapid passages with wide intervals (Kubik 1966, 1967).

> In some East and Central African instrumental ... musicians playing together (or in the case of a soloist, his left and right hands or fingers) produce rhythmic patterns, which are not perceived by the listener as they ... Instead of this he hears a conflict of other rhythms, which are not played as such but arise in his imagination (Kubik 1962, p.33).

Kubik stresses that the inherent patterns are not a random phenomenon in this music but are clearly aimed at by the composers who use particular compositional devices to ensure that there is a perceptual breaking up of the resultant patterns into several autonomous lines (Kubik 2010a, p.70).

Bistability / Multistability

Bistable or multistable states is the blurring of conventional foreground and background relationships i.e. when there is ambiguity in the figure and ground organisation of a scene. Bistability describes a spontaneous shifting experienced between what is interpreted as the 'figure' or the 'ground' in the auditory or visual scene. In general, the more bistable the system is then there is less control over the figure/ground perception. The phenomenon of 'Auditory Streaming', can being conceptualised as a perceptual bistable phenomenon which is the equivalent of visual bistability in audition (Denham, Winkler, 2006).

OVP

'Object Voice Phenomena' (OVP); a newly proposed term –in direct reference to Electronic Voice Phenomena (EVP)– that describes the apophenic illusion of hearing voices from the broadband sonic matrix deliberately created through an intensive manipulative sound interaction with any object. Implicit in the term is a critique of the 'electronic' as *the* sole conduit of the ghostly voices heard.

Pareidolia

Pareidolia is a type of apophenia, a neurological phenomenon of seeing or hearing a pattern in random stimuli but more specifically involving the perception of images and sounds for example, seeing the 'man' in the moon or hearing voices in the wind. The word comes from the Greek words *para* ('beside, alongside, instead') in this context meaning something faulty, wrong, instead of; and the noun *eidōlon* ('image, form, shape') the diminutive of *eidos*.

'Auditory pareidolia' can be used to describe pareidolia in the auditory domain e.g. hearing voices where there are none (see Sacks 2008, Bauman 2011).

Perceptual ambiguity

Ambiguity in the perceptual sense is generally taken to be a property enjoyed by signs that bear multiple (legitimate) interpretations. Something is ambiguous if it is perceived has having two or more (equally valid) meanings. A visual illusion, such as the well-known rabbit and duck reversible image (see Figure 74) clearly illustrates this.

Phantasmagenics

Phantasmagenics is a general term to denote the collection of perceptual mechanisms, present in all humans, which explain the generation of sonic illusions with an appearance of ghostly presence. This includes natural and common cognitive responses such as apophenia and pareidolia.

Phantasmatic

I use this term to refer to the quality of ghostly presence in an operational sense. That is, in relation to the different techniques and strategies that can be used to generate or induce phantasmal presence or appearance.

Pseudo-polyphony

Pseudo-polyphony (also known as compound melodic line) is where a sequence of pitches performed by one voice or instrument rapidly alternates between a high and a lower register to give the impression of multiple concurrent parts evoking a kind of yodeling effect.

Resultant rhythms

Kubik (2010a, p.70) makes a distinction between his 'inherent' or 'subjective' patterns and the contrasting nature of 'resultant rhythms' as described by A.M.Jones (Jones 1961; Jones 1966). Resultant rhythms are the summing up of all the component parts in a 'rhythmic-melodic' combination as opposed to inherent patterns, which arise as the result of the perceptual breaking up of those resultant patterns into several independent lines (Kubik 2010a, p.70).

Semantic Satiation

'Semantic satiation', is a psychological phenomenon in which the uninterrupted repetition causes a word or phrase to temporarily lose meaning for the listener (Jakobovits 1962).

Professor of psychology Richard M. Warren at the University of Wisconsin-Milwaukee conducted perhaps the most in-depth scholarly research into this phenomenon in the 1960's, which he referred to as 'verbal transformation effect'(see for example Warren 1961)

Semantisation

I use this term to refer to the process of generation of semantic meaning out of initially meaningless fragments of sonic manifestations and in particular, as caused by processes of sonic repetition.

Sonic Animism

Animism is the attribution of life to something where there is none (Guthrie 1995).

> Faces and other human forms seem to pop out at us on all sides. Chance images in clouds, in landforms and in inkblots present eyes, profiles or whole figures. Voices murmur or whisper in wind and waves. We see the world not only as alive but also as humanlike. Anthropomorphism pervades our thought and action (Guthrie 1995, p.62).

I use the term 'sonic animism' to refer to the attribution of an *aliveness* to our experienced sonic world even where there is none as such. We often hear voices in the wind, in white noise, in random noisy recordings where there are none. More generally I also use 'sonic animism' to emphasise sounds being 'lived' and fully experienced, inhabited or embodied.

Sonic blotscapes

I use the term 'sonic blotscape', which is directly related to the idea of the 'chance image' and 'blotscape' (Janson 1973) and 'projection' (Leal 2009; Woodfield 1996; Gombrich 1973; Gamboni 2004; Banks 2012) to refer to intentional hands-on, practical, experimentation, which can lead to fruitful accidental sonic discovery. Chance images are meaningful visual or sonic patterns perceived in materials – such as rocks, clouds, blots, or for sound, wind, water, machines - that have not been (or cannot be consciously) shaped by man. The 'sonic blotscape' activates my listening imagination and inspires, projects and suggests 'meaningful' forms and encourages an intriguing and heightened *Gestalt*-like listening experience.

Sonic Phantoms

I propose this term to describe a particular category of auditory illusions. Sonic phantoms not only 'trick' the ear by producing deceiving impressions of spatial or temporal experience, as

other acoustic illusions do; they are hearing illusions that specifically give rise to the generation of illusory entities or patterns that have the character of presences with apparent semantic or meaningful features. In other words, they manifest as a ‘phantasmatic’ emergent phenomenon.

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AV02 -|**Harp Phantoms#02**| - stick & metal strum-live [2:29]
AV02a -|metal strum video demo-acoustic| - [1:51]
AV03 -|**Harp Phantoms#03**| - sticks - studio & live [5:15]
AV03a -|stick action video demo-acoustic| - [0:56]
AV04 -|**Harp Phantoms#04**| - random plucks- studio & live [7:29]
AV04a -|random plucks video demo-acoustic| - [0:22]
AV05 -|**Harp Phantoms#05**| - blu-tack tune-studio & live [1:40]
AV05a -|blutack tune video demo-acoustic| - [1:01]
AV06 -|**Harp Phantoms#06**| - strum-studio & live [12:33]
AV06a -|thumb gliss video demo-acoustic| [1:03]
AV07 -|**Harp Phantoms#07**| - cork & mallet-studio & live [11:50]
AV07a -|sound of prepared strings video demo-acoustic| - [0:57]
AV08 -|**Harp Phantoms#08**| - 2-note pattern-studio & live [8:37]
AV08a -|2 finger pattern enharmonic –pedals-video demo-acoustic1| [0:43]
AV08b -|2 finger pattern enharmonic –pedals-video demo-acoustic2| [0:48]
AV09 -|**Harp Phantoms#09**| - 6-note pattern-studio [32:08]
AV09a -|alternating pattern video demo-acoustic-1| [0:59]
AV09b -|alternating pattern video demo-acoustic-2| [0:55]
AV10 -|**Harp Phantoms#10**| - glissandi pattern-studio [10:33]
AV11 -|**Harp Phantoms#11**| - Vázquez & Ellison (Het Nutshuis) –Live [12:21]
AV12 -|**Harp Phantoms#12**| - Rhodri Davies (St. Pauls Church, Huddersfield) –live [14:10]
AV13 -|**Harp Phantoms#13**| - I hit the wall-studio [6:53]
AV14 -|**Harp Phantoms#14**| - Wave Field Synthesis performance (Harp & organ)-live [22:02]
AV14a -|bike spokes with stick pluck example| [0:59]
AV15 -|Amplified concrete blocks-example| - from 'Phase portrait'- 'het Gemaal 08' [0:59]
AV16 -|**Drawing Phantoms#01**| - the drawing room –live [7:30]
AV17 -|**Drawing Phantoms#02**| - drawing & looping pattern –live [14:59]
AV18 -|**Drawing Phantoms#03**| - drawing ovp#1 [13:03]
AV19 -|**Drawing Phantoms#04**| - séance –live [23:45]
AV20 -|**Drawing Phantoms#05**| - drawing ovp#2 [19:11]
AV21 -|**Drawing Phantoms#06**| - drawing & looping (loop station –live) [14:13]
AV22 -|**Drawing Phantoms#07**| - the way she sits [2:26]
AV23 -|**Drawing Phantoms#08**| - can you see her [4:58]
AV24 -|**Drawing Phantoms**- (documentation video)| - séance [1:30]
AV25 -|**Vocal Phantoms#01**| - tts#01-kyoko (one six) [1:43]
AV26 -|**Vocal Phantoms#02**| - tts#02-esther (numbers) [2:28]
AV27 -|**Vocal Phantoms#03**| - tts#03-kyoko (one seven) [0:57]
AV28 -|**Vocal Phantoms#04**| - tts#04-alva (again&again) [2:09]
AV29 -|**Vocal Phantoms#05**| - tts#05-mette (choova) [2:27]
AV30 -|**Vocal Phantoms#06**| - tts#06-mette (again&again) [1:51]
AV31 -|**Vocal Phantoms#07**| - tts#07-stine (error) [0:52]
AV32 -|**Vocal Phantoms#08**| - tts#07-the other voice [14:24]
AV33 -|**Vocal Phantoms#09**| - tts#09-esther (edgewho) [5:35]
AV34 -|**Vocal Phantoms#10**| - tts#10-esther (edgewho&sticks) [2:21]
AV35 -|**Vocal Phantoms#11**| - tts#11-semantisation#1 [6:33]
AV36 -|**Vocal Phantoms#12**| - tts#12-semantisation#2 [7:00]

AV37 -|**Vocal Phantoms#13**| - tts#13-owl&pussy [7:50]
AV38 -|**Vocal Phantoms#14**| - tts#14-on/off [18:44]
AV38a -|**Vocal Phantoms#14**| - tts#14-on/off#2- extract [02:26]
AV39 -|**Vocal Phantoms#15**| - untie/takes place [3:02]
AV40 -|**Vocal Phantoms#16**| - untie [5:42]
AV41 -|**Vocal Phantoms#17**| - semantic satiation hearing speech [1:07]
AV41a -|**Diana Deutsch**- Speech-to-song illusion- 'But they sometimes behave so strangely- from 'Phantom words and other curiosities'| [3:45] Philomel Records (2003)
AV41b -|**Diana Deutsch**- 'Phantom words' from 'Phantom words and other curiosities'|-extract [0:57] Philomel Records (2003)
AV41c -|Phantom word pairs (my own examples)| - [21:48]
AV42 -|**Vocal Phantoms#18**| - vocal phantoms-live [8:59]
AV42a -|**Vocal Phantoms#18** -breathy loop motif example| - [05:31]
AV42b -|**Vocal Phantoms#18** -hehheee loop motif example| - [7:19]
AV42c -|**Vocal Phantoms#18** -heehuuuaa loop motif example| - [0:31]
AV42d -|**Vocal Phantoms#18** -heeehhhhuuuhhh loop motif example| - [0:23]
AV42e -|**Vocal Phantoms#18** -example motif development for a scene| - [1:29]
AV43 -|**Vocal Phantoms#19**| - Avatar-the other voice [4:31]
AV44 -|**Vocal Phantoms#20**| - cogitate [1:00]
AV45 -|Sandra Ikkidluak & Crystal Mullin –'dogsled'| - [1:25]
AV46 -|grasshopper| - 4 times normal speed 4 times slower [0:13]
AV46a -|Cicada| - 4 times normal speed 4 times slower [0:20]
AV46b -|Cricket| - 4 times normal speed 4 times slower [0:16]
AV46c -|Frog| - 4 times normal speed 4 times slower [0:14]
AV47 -|Insects (Mmabolela) -spectrogram| [0:59]
AV47a -|Insects (Mamori) -spectrogram | [0:57]
AV48-|Frogs (Cambodia)-spectrogram| [0:38]
AV49 -|**Natural Phantoms#01**| - amazon [2:05]
AV50 -|**Natural Phantoms#02**| - borneo dawn [3:47]
AV51 -|**Natural Phantoms#03**| - borneo dusk [20:02]
AV52 -|**Natural Phantoms#04**| - borneo night frogs [20:01]
AV53 -|**Natural Phantoms#05**| - cambodia (toads) [6:14]
AV54 -|**Natural Phantoms#06**| - cambodia (cicadas & birds) [7:09]
AV55 -|**Natural Phantoms#07**| - australia (frogs) [6:46]
AV56 -|**Natural Phantoms#08**| - frog phantoms (australia,amazon,cambodia) [16:44]
AV57 -|**Natural Phantoms#09**| - underwater phantoms (mmabolela) [8:54]
AV58 -|**Natural Phantoms#10**| - forest phantoms (borneo, cambodia, australia) [22:35]
AV59 -|**Croiners** - A Sample|–From the compilation album 'Winnie's Impasse' [1:40] no label (1985)
AV60 -|**Manon Anne Gillis** – 'Thalibilis' from album 'Euragine'- [4:02] Sounds For Consciousness Rape – SFCR CD005 (1994)
AV61 -|**The User** - Dot matrix Printer Symphony| -extract [2:52] -Staalplaat records (2002)
AV62 -|V.A-**RRR**-1000 Lock Groove LP | compilation-extract [1:26] RRRecords (2009)
AV63 -|**The adjective Noun** - Anti-Record#3-extract |[1:37] -Obsolete Audio Formats – (2006)
AV64 -|**Martin Arnold**-Passage à l'acte by | -extract [5:47] Anon, 2012.Available at: http://www.youtube.com/watch?v=0jJtSv-o-m4&feature=youtube_gdata_player [Accessed Sept 10, 2014].
AV65 -|**Maryanne Amacher** – 'Head Rhythm 1 and Plaything 2' from 'Sound Characters (Making The Third Ear)'| -extract [2:25] Tzadik – TZ 7043 (1999)
AV66 -|**Oval** – 'Do While' from '94diskont'| -extract [2:19] Mille Plateaux (1995)
AV67 -|**John Oswald** 'Brazilianaires Theme' from '69 Plunderphonics 96'| -extract [2:30] Seeland 515CD, fony -69/96 (2001)
AV68 -|**Darth Vader Breathing** 10 Hours | -extract [1:14] Available at: http://www.youtube.com/watch?v=un8FAjXWOBY&feature=youtube_gdata_player [Accessed September 10, 2014].
AV69 -|**Can You Survive 10 Hours of Patrick Star Asking** '**Who You Calling Pinhead**?'| -extract [1:18] Available at: http://www.youtube.com/watch?v=R_rEWiacfHg&feature=youtube_gdata_player [Accessed September 3, 2014].

AV70 -| **Puddi Puddi** 10 hours| -extract [1:43] Available at: http://www.youtube.com/watch?v=7LKHpM1UeDA&feature=youtube_gdata_player [Accessed September 3, 2014].

AV71 -|**Phill Niblock** – Harm from 'Touch Three'(2003)| -extract [1:13] Touch records(2006)

AV72 -|**Xenakis** -Persepolis| -extract [1:44] Published By –Éditions Salabert, label -Phillips(1972)

AV73 -|**Paul Dolden** – 'L'Ivresse De La Vitesse' | -extract [1:44] Empreintes DIGITALes (1994)

AV74 -|**V.A. Voyage chamanique 1/2** –'Mongolie- Shamans & Lamas'-extract [1:04]-Collection Ocora Radio-France (1994)|

AV75 -|**Erik Satie** -Reinbert De Leeuw-'Vexations' -extract [1:51] Philips (1983)

AV76 -|**Morton Feldman**- String Quartet No. 2 (1-28) Flux Quartet| -extract [1:42]- Mode (2002)

AV77 -|**Stockhausen**-'Evas Zauber' - 'Montag aus LICHT'| -extract [1:05] Stockhausen CD's (1988)

AV78 -|**Eliane Radigue** -Adnos I-III-3CD | -extract [1:26] Table of the Elements(2002)

AV79 -|**Ligeti**- Poeme Symphonique pour 100 métronomes| -extract [1:16] Available at: http://www.youtube.com/watch?v=d9daZeGs3gU&feature=youtube_gdata_player [Accessed September 4, 2014].

AV80 -|**Ligeti**- 'Atmosphères'| -extract [2:39] WERGO (1967)

AV81 -|**Penderecki** –'Threnody (for the Victims of Hiroshima)'| -extract [1:03]EMI classics (2012)

AV82 -|**Kpelle -** Guinea- 'Daa-Zaa-To (Funeral)'| -extract [3:05] Inedit (1998)

AV83 -|**Aka Pygmées**- 'Movunga dika na lele tao'| -extract [2:24] Ocora (1998)

AV84 -|**Cameroon -Baka Pygmy Music**-'Humming of the bees'| -extract [2:11] Unesco (2000)

AV85 -|**Zimbabwe - Soul Of Mbira**-Taireva | -extract [1:21] Nonesuch (1973)

AV86 -|**Banda Polyphony**-Music for Ongo Ensemble- **Ndjradje Balendro** (Initiation Song)| -extract [2:23]Unesco collection (1976)

AV87 -|**Anchiskhati** choir- 'Chochkhatura'| -extract [0:23] (personal recording (López /Ellison (2012)) from Georgia)

AV88 -|**Russian women Panpipe ensemble** (Kursk region)-from OlgaVelitchkina| -extract [0:11] EOL2/Velitchkina. Available at: http://www.umbc.edu/eol/2/velitch/velich1.html [Accessed September 10, 2014].

AV89 -|**Tom Thum**, Beatbox brilliance- at TEDxSydney | -extract [0:28] Available at: http://www.youtube.com/watch?v=GNZBSZD16cY&feature=youtube_gdata_player [Accessed September 4, 2014].

AV90 -|**Sandra Ikkidluak & Crystal Mullin** –'The Saw' | [0:37] (from-Ellison/Pan/Manousakis personal recordings (2010))

AV91 -|**Georg Philipp Telemann**- 'Sonata for Recorder in C major', (TWV 42-C2) | -extract [0:56]-Brilliant Classics (2000)

AV92 -|**Bach**, Partita in A Minor, BWV 1013(1722–23)| -extract [0:30] Available at: http://www.youtube.com/watch?v=MQlRJO455JM&feature=youtube_gdata_player [Accessed September 10, 2014].

AV93 -|**György Ligeti** -Etude no.8 –Fem ('Metal') | -extract [1:10] Available at: http://www.youtube.com/watch?v=QYNCMIHgaaA&feature=youtube_gdata_player [Accessed September 4, 2014].

AV94 -|**György Ligeti** -Etude no.10 –'Der Zauberlehrling'| -extract [1:04] Available at: http://www.youtube.com/watch?v=jZ2CHgWfipY&feature=youtube_gdata_player [Accessed September 10, 2014].

AV95 -|**György Ligeti** – 'Continuum' for harpsichord from 'Mechanical Music' | -extract [2:16] Sony Classical (1997).

AV96 -|**Louis Andriessen** – 'Hoketus' from 'Industry' Bang on a can| -extract [1:25]Sony Music Distribution (1995)

AV97 -|**Charlemagne Palestine** – 'Strumming Music'| -extract [1:27] New Tone Records (1995)

AV98 -|**Meredith Monk**-'Hocket' Live with Theo Bleckmann| -extract [1:34] Available at: http://www.youtube.com/watch?v=enbHYaF8Vas&feature=youtube_gdata_player [Accessed September 4, 2014].

AV99 -|**Michael Gordon**-'Timber'| -extract [1:02] Slagwerk Den Haag - Available at: http://www.youtube.com/watch?v=sJyykQe0fTs&feature=youtube_gdata_player [Accessed September 4, 2014].

AV100 -|**Xenakis** –'Pléïades', II 1-2| les percussions De Strasbourg-extract [2:15] harmonia mundi (1996)

AV101 -|**Incapacitants** –'Stone River' from 'Ministry Of Foolishness' | -extract [1:52] Pure (1995)

AV102 -|**Merzbow** –'Ananga-Ranga' from 'Venereology'| -extract [1:21] Release Entertainment (1994)

AV103 -|**Mubayiwa Bandambira** 'Dangurangu'-from Paul F. Berliner - Zimbabwe - The Soul Of Mbira | -extract [1:15] – Nonesuch (1995)

AV104 -| **Peter Cooke Uganda Collection** –'Sematimba ne Kikwabanga' -akadinda- extract [2:43] - World and traditional music | British Library - Sounds. Available at: http://sounds.bl.uk/World-and-traditional-music/Peter-Cooke-Uganda/025M-C0023X0003XX-1400V0 [Accessed September 6, 2014].

AV105 -| **Royal Court Music From Uganda** 1950 & 1952 -'Katego' –Akadinda -| -extract [1:22] SWP records (1998)

AV106 -|**Michael Esposito** -'Help me someone' -EVP recording from-'Jaaljth'| -extract [1:44] by Francisco López & Michael Esposito| GERÄUSCHMANUFAKTUR (2014)

AV107 -|**Harp Phantoms-**workshop| - [7:29]

AV109 -|**Natural Phantoms-**Cambodia (documentation video)| - [1:38]

AV110 -|**Natural Phantoms-** Borneo (documentation video)| - [2:50]

List of 'Sonic Phantoms' Compositions

PORTFOLIO

A red 'V' indicates a video.

AV01 -|Harp Phantoms#01| - pluck & scrape-live [6:44]
AV02 -|Harp Phantoms#02| - stick & metal strum-live [2:29]
AV03 -|Harp Phantoms#03| - sticks - studio & live [5:15]
AV04 -|Harp Phantoms#04| - random plucks- studio & live [7:29]
AV05 -|Harp Phantoms#05| - blu-tack tune-studio & live [1:40]
AV06 -|Harp Phantoms#06| - strum-studio & live [12:33]
AV07 -|Harp Phantoms#07| - cork & mallet-studio & live [11:50]
AV08 -|Harp Phantoms#08| - 2-note pattern-studio & live [8:37]
AV09 -|Harp Phantoms#09| - 6-note pattern-studio [32:08]
AV10 -|Harp Phantoms#10| - glissandi pattern-studio [10:33]
AV11 -|Harp Phantoms#11| - Vázquez & Ellison (Het Nutshuis) –Live [12:21]
AV12 -|Harp Phantoms#12| - Rhodri Davies (St. Pauls Church, Huddersfield) –live [14:10]
AV13 -|Harp Phantoms#13| - I hit the wall-studio [6:53]
AV14 -|Harp Phantoms#14| - Wave Field Synthesis performance (Harp & organ)-live [22:02]

AV16 -|Drawing Phantoms#01| - the drawing room –live [7:30]
AV17 -|Drawing Phantoms#02| - drawing & looping pattern –live [14:59]
AV18 -|Drawing Phantoms#03| - drawing ovp#1 [13:03]
AV19 -|Drawing Phantoms#04| - séance –live [23:45]
AV20 -|Drawing Phantoms#05| - drawing ovp#2 [19:11]
AV21 -|Drawing Phantoms#06| - drawing & looping (loop station –live) [14:13]
AV22 -|Drawing Phantoms#07| - the way she sits [2:26]
AV23 -|Drawing Phantoms#08| - can you see her [4:58]
AV24 -|Drawing Phantoms -documentation video**|** - séance [1:30]

AV25 -|Vocal Phantoms#01| - tts#01-kyoko (one six) [1:43]
AV26 -|Vocal Phantoms#02| - tts#02-esther (numbers) [2:28]
AV27 -|Vocal Phantoms#03| - tts#03-kyoko (one seven) [0:57]
AV28 -|Vocal Phantoms#04| - tts#04-alva (again&again) [2:09]
AV29 -|Vocal Phantoms#05| - tts#05-mette (choova) [2:27]
AV30 -|Vocal Phantoms#06| - tts#06-mette (again&again) [1:51]
AV31 -|Vocal Phantoms#07| - tts#07-stine (error) [0:52]
AV32 -|Vocal Phantoms#08| - tts#07-the other voice [14:24]
AV33 -|Vocal Phantoms#09| - tts#09-esther (edgewho) [5:35]
AV34 -|Vocal Phantoms#10| - tts#10-esther (edgewho&sticks) [2:21]
AV35 -|Vocal Phantoms#11| - tts#11-semantisation#1 [6:33]
AV36 -|Vocal Phantoms#12| - tts#12-semantisation#2 [7:00]
AV37 -|Vocal Phantoms#13| - tts#13-owl&pussy [7:50]

AV38 -|Vocal Phantoms#14| - tts#14-on/off [18:44]
AV39 -|Vocal Phantoms#15| - untie/takes place [3:02]
AV40 -|Vocal Phantoms#16| - untie [5:42]
AV41 -|Vocal Phantoms#17| - semantisation#3 [1:07]
AV42 -|Vocal Phantoms#18| - vocal phantoms-live [8:59]
AV43 -|Vocal Phantoms#19| - Avatar-the other voice [4:31]
AV44 -|Vocal Phantoms#20 | - cogitate [1:00]

AV49 -|Natural Phantoms#01| - amazon [3:01]
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AV51 -|Natural Phantoms#03| - borneo dusk [20:02]
AV52 -|Natural Phantoms#04| - borneo night frogs [20:01]
AV53 -|Natural Phantoms#05| - cambodia (toads) [6:14]
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AV55 -|Natural Phantoms#07| - australia (frogs) [6:46]
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AV107 -|Harp Phantoms-workshop| - [7:29]
AV108 -|Vocal Phantoms- Sandra Ikkidluak & Crystal Mullin –'dogsled'| - [1:25]
AV109 -|Natural Phantoms-Cambodia (documentation video)| - [1:38]
AV110 -|Natural Phantoms- Borneo (documentation video)| - [2:50]