INSIDE THE INTIMATE ZONE: THE CASE OF AURAL MICRO_SPACE IN MULTICHANNEL COMPOSITION PRACTICE

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ABSTRACT

This paper aims to present the notion of aural micro-space, an area whose aural architecture is not accessible unless it is mediated by recording technology and discuss the exploration of this concept in compositional practice. The author analyses the characteristics of acoustic space from a spectromorphological, cultural and technical perspective, with a focus on auditory intimacy and is proposing novel ways for working in this domain with references to two multichannel acousmatic works, Topophilia and Karst Grotto.

1. INTRODUCTION

The articulation of acoustic space as a feature of musical practice is something that has been discussed widely in the electroacoustic music literature over the last two decades as a proliferation of works which utilise more than two channels indicated an increased sensibility towards aural architecture, immersivity and the articulation of acoustic space as a carrier of musical structure in electroacoustic music. Alongside the development of theoretical concepts which allow the consideration of space in this context [1] and the analysis of compositional practices specifically relating to the organisation of space [2] [3] [4], we have seen considerable developments in the tools that composers use to explore sound materials which cater for the realisation of existing processes (panning, granular reconstruction, algorithmic organisations etc) in multichannel formats. The use of space, often referred to as the final frontier, appears to be addressing issues relating the reception of electroacoustic music and to the materiality of acousmatic sound.

2. COMPOSING SPACE

Considering the evolution and increased sophistication of time and frequency domain processing strategies since the inception of a sound based musical language, in order to achieve the rich spectromorphological sound vocabulary which characterises current electroacoustic music works, the strategies employed to generate and organise acoustic space appear to have developed little in comparison. These normally involve the placement of sounds in a field defined by the number of channels and their position around the listening spot, the panning of sounds in that field and the presentation of acoustic space as resonance, defined by Macedo as the acoustic effects of the environment on sound [5]. The latter is either recorded, almost always in stereo, or simulated using ubiquitous studio techniques. A notable exception to this is the use of ambisonic recording techniques to capture a more detailed circumferential acoustic space however, the lack of B-Format sound processing tools hinder the use of such recordings in common workflow practices. A more recent addition to the above is the creation of acoustic space by embedding spatial dispersion of the output in time and frequency domain processing; distribution of grains in granular reconstruction / synthesis or distribution of spectral bands respectively. These techniques are usually combined in the construction of acoustic space in multichannel works.

It should be noted here that although other attributes of the sound object, amplitude, timbre (including pitch) and duration, are considered collectively as a totality, the methodology outlined above suggests that space is considered separately. In discussions of compositional practice in this context, it is even suggested that the sound image consists of sounds and their spatial dispositions, two separate things [2]. Although this suggestion reflects a reality of spatio-musical compositional strategy, it indicates a visucentric approach rooted in the attributes of visual space, a concept whose characteristics are contrasting those of acoustic space as discussed in detail by McLuhan [7]. McLuhan's binary, reductive and essentialist approach to the discussion of space provides a unique theoretical framework through which to examine spatial music practice in general and more pertinently, in multichannel electroacoustic composition. The one-at-a-time approach to the consideration and construction of space is according to McLuhan rooted to the dominance of visual culture in the shaping of western thought and is contrasting the nature of acoustic space which is characterised by the lack of boundaries and the presence of centres everywhere to be perceived simultaneously. The compositional practice discussed below aims to explore an approach to working with space informed by these concepts and investigate, in the context of compositional practice, what McLuhan calls the "mentality of the multitude, or as Yeats put it: everything happening at once, in a state of constant flux" [7].

In addition, the approach to the construction of acoustic space in multichannel works, which more often

than not relies on the strategies outlined above, is somewhat detached from the acousmatic working ethos, which is rooted in the collaboration between the composer and the qualities of the sound material [8]. A concrete way of working which favours an exploration of the qualities of raw materials for the construction of abstract musical meaning [6] over an architectonic approach to composition, which is alluded to by the fragmentation and consideration of the attributes of the material in separation. The spectromorphological profiles of collected sound materials imbue the resulting sound world of the composition regardless of the ability of listeners and /or the composer to trace any relationship of the latter to the former. In the case of spatial attributes, although this might in some instances be also true in stereo works, it appears that spatial organisation of sound objects in multichannel works, and perhaps also in sound diffusion based performances, is subject to a more abstract way of thinking. The compositional practice employed in the development of the two acousmatic works discussed below is an attempt to unify spatiomorphology and spectromorphology [9] in the workflow; to consider those in conjunction with each other during the development and arrangement stages of the compositional process.

3. AURAL MICRO-SPACE

The classification of our perception of space offered by the theory of proxemics [11] is a useful starting point to consider the acoustic spaces created by acousmatic works. Smalley discusses many of the about 50 different types of space defined in his seminal work on the subject in relation to the four distance zones: intimate, personal, social and public. The notion of intimacy in terms of aural experiences is used here in metaphorical terms i.e. gestural space but also in experiential terms, i.e. microphone space. The use of microphone techniques to invoke perception of proximity also appears in discussions of popular music techniques [10] and the ability of sound reproduction technologies to invoke aural intimacy through mediated sound is discussed in analyses of mediatized culture [12]. The above refer to perceptions of sound events inside the intimate zone, defined as an area up to 45cm from the listening position. Aural intimacy also appears as a perception of sound events in personal and social space zones in discussions of aural architecture [13] and psychological perceptions of human presence.

A number of relatively recent acousmatic works appear to be occupied with notions of intimacy and proximity as it transpires from their titles and program notes. Examples include Stollery's *Shortuff,* where the composer is making reference to sounds being "upfront with little middle or background", Blackburn's *Switched On* and *Time Will Tell,* where the composer refers to microscale ticks, tocks, clanks and bumps as well as sonic microstructures and Redolfi's *Micro Espaces 5808,* where the composer is referring to "microscopic sound spaces picked up by close-miking."

Henricksen, in his discussion of space as an essential element of expression in electroacoustic music alludes to the effectiveness of musical activity in intimate space."Intimacy and the expansion of musical space into the listener's psychological private sphere can be a powerful means in musical expression" [14].

The idea of intimate acoustic space is prevalent in the author's previous work and has been implicit by the use of spectromorphological characteristics which suggest proximity: the absence of reflections, the prevalence of high frequency content and impulse like onsets. In addition, the majority of the author's compositional output makes use of acoustic space as a structural element of the work through the use of multichannel audio. The articulation of acoustic space here is used to enhance clarity of sound materials by exemplifying their character and musical functions [3] [4]. In these cases, acoustic space in the work of the author was constructed using the techniques discussed in the opening sections of this paper and separately from the development of derivative spectromorphologies from original recordings. The approach outlined below is an attempt to connect spatial behaviour to the other qualities of sound materials using multichannel recording techniques in what is here defined as aural micro-space. Aural space is defined by Blesser as "area where inhabitants can hear sonic events" [13]. The ability to hear sonic events allows inhabitants to perceive the structure of the acoustic space. Based on this concept, aural micro-space is defined as an area of acoustic space, which cannot be inhabited due to physical constraints, which relate to size. Aural architecture exists in micro space-but it is not accessible unless mediated by recording technology. It should be noted here that although the structure of acoustic space is not accessible, sound events themselves can be audible as a nested space [14].

4. COMPOSITIONAL PRACTICE

The sections below describe the author's approach in recording and working with aural micro-space in the composition of two multichannel acousmatic works, *Topophilia a*nd *Karst Grotto.*

4.1. The impulse

The inspiration for this work sprung from an encounter with a youtube video on a popular science website. The video depicted the behaviour of a number hydrophylic polymer beads, also known as water balls or hydrogel beads, coming in contact with the hot surface of a frying pan. The release of vapour from the polymer is causing them to bounce and emit a high-pitched impulse sound. Frying hydrogel beads appears to have gained significantly in popularity in the last year and a half and a quick online search will result in plenty of examples of this. In addition to what appeared to be a deeply satisfying timbral quality, this event displayed a very interesting, and in some ways rare, spatial behaviour as the bouncing of balls decelerated only when their water content was significantly reduced. The initial urge to replicate the phenomenon in order to record it was soon hampered by the realisation that a stereo recording technique would only

capture a pointillistic texture rather than the complex spatial behaviour observed in the video. This led to considering the appropriation, the scaling down, of multichannel recording techniques.

4.2. Microphone array design and initial observations

Initial experiments involved attempts to record sound material using multichannel techniques in spaces comparable in size with the area covered by the phenomenon in the video. Evidently, the size of the microphone capsule was the single most problematic aspect of this endeavour. The size of microphones usually employed in standard multichannel recording arrays, which typically occupy planes with circumference of a few feet, was not much smaller than the size of the area that was to be recorded. The attempt to solve this issue involved scaling down a Polyhymnia pentagon, a surround microphone array invented by Dutch recording and post-production studio – Polyhymnia International, formerly Philips Classics Recording Department - which is used widely to record choirs and instrumental ensembles. This technique is based on five widely spaced omnidirectional microphones [16]. The test recordings where conducted using five DPA 4060 miniature omnidirectional microphones

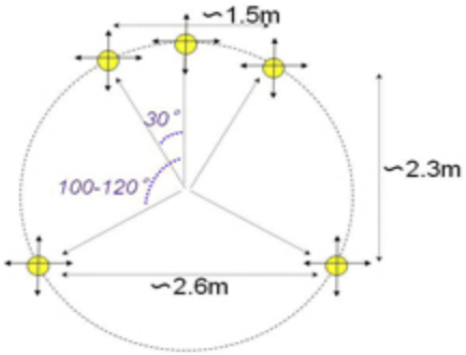

Figure 1. Polyhymnia pentagon.

arranged in a circle with a diameter of circa 12cm (Figure 2). Recording subjects included an approximation of the observed phenomenon, which involved scattering pulse grains on hard surfaces around the microphone array, as well as circular movement of single grains in small circumference (a few centimeters), gestural trajectories across the recorded space (scraping on different materials) and recordings inside resonating structures (the bell of a cymbal). Although it is not possible to evaluate the accuracy of the representation of the acoustic space that was recorded, as we were dealing with aural micro-space, recordings displayed a strong spatiality and a perceived increased materiality / tangibility. Concerns that the extreme proximity of the microphones would compromise channel separation to the extend that spatial cues will be rendered illegible were not corroborated.

Following these initial tests, the hypothesis that increased perceived materiality and tangibility of source sounds would positively affect signification – the process of a sequence of sounds acquiring musical meaning [17] was formed. This hypothesis is based on the notion that the material vehicle is closely related to the musical idea that it bears "musical signification changes substantially when sound materiality is changed" [17].

Figure 2. DPA array.

Initial tests were followed by attempts to reduce further the size of the array and to test alternatives to the expensive microphones used initially, in order to undertake recordings in less controlled and more challenging environments, like inside a hot frying pan. These attempts involved working with two sets of affordable electret condenser microphone capsules with a diameter of 1cm and 0.5 cm respectively. The challenge in this next phase was to retain the angular positions specified in the Polyhymnia model. This was overcomed by the use of 3D printed casings, specifically designed to hold the microphones in the correct position whilst significantly reducing the overall size of the array (Figures 3 and 4).

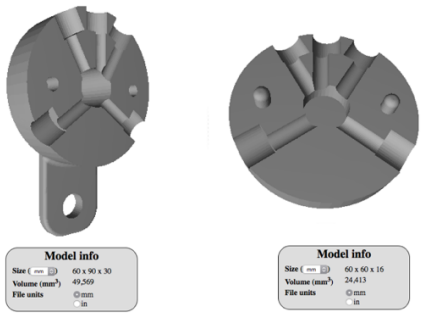

Figure 3. Microphone casing 3D designs.

This idea resulted in two new recording arrays with diameters of 6cm and 3.5cm (Figure 4), which allowed recordings of spatial behavior in more compact spaces and eventually the recording of the acoustic space created by the water beads in the hot frying pan. The use of the casings resulted in increased separation between the channels of the array that lead to an improved clarity of spatialspatial imaging.

All sound materials collected using the DPA and the electret condenser arrays where treated as 5 channel coherent audio stream sets [18] and where processed using multichannel tracks in a DAW. Original recordings where only processed using

Figure 4. Mounted arrays.

plugins which catered for multichannel sources in an effort to embed the characteristics of the sources' acoustic space in the development of new materials. This is not to say that the acoustic space captured in the recordings is retained in the processed sounds materials, but rather that it inoculates the resulting spatiomorphologies. These sound materials formed the starting point for two fixed media multichannel works, Topophilia and Karst Grotto, which are discussed briefly below.

4.3. Topophilia

The concept of topophilia relates to attraction or affinity to place, the bond between a person and a specific locality. Topophilia is understood to be the result of the perception of a particular environment, "the response of senses to external stimuli and purposeful activity" [19]. In this case the term is borrowed to suggest the allure of a type of place – a space instilled with musical meaning – which displays characteristics of intimacy and closeness. An abstract musical topos, which exists in the intimate and personal zones and is rooted in the concrete materiality of the sound objects inhabiting it. The work is not only an artistic interpretation of the notion of aural-micro-space but also an attempt to work with the reality of such a notion in a way that the latter permeates the former. In Topophilia, texture and spatially defined figures have a broader capacity for action due to their multichannel nature. The work has been performed widely, published on CD by *Musiques & Recherches* and has been awarded numerous accolades[1].

4.4. Karst Grotto

Karst Grotto was composed during residencies at the Department of Music Technology and Acoustics in Crete and the Institute for Computer Music and Sound Technology in Zurich. The title, chosen for its onomatopoeic qualities and its direct references to landscape types, as well as geological spatial structures and processes, reflects the sound world of the work. Karst, a particular topography is created by the dissolution of soluble rock types from their contact with acidic rain water. A micro-level chemical process which characterises the morphology of entire landscapes and results in complex networks of small-scale, micro-space, features and textures like fissures and rillenkarrens.

This work is building on the techniques used in Topophilia by using ambisonic technology to encode in 3rd-order B-Format multichannel stems of raw and processed recordings as soundfield planes which could be rotated (yaw, pitch and roll) on three axes whilst maintaining a coherent plane structure. The five discrete channels of each 5.0 and 5.1 stem were treated as point sources and were positioned in the soundfield to delineate a plane by mirroring the ITU-R recommendation for 5.1 systems and the Polyhymia array (the arrangement of speakers in the recommendation is identical to the arrangement of microphones in this particular array). The three types of rotations mentioned above increased further the compositional capacity of micro-space.

5. CONCLUSIONS

The compositional methodology employed in the two multichannel fixed media works discussed above attempted to explore in practice the concept of micro-space as this is defined in this paper. The premise that the aural architecture of micro-space could be accessed by adapting existing multichannel recording techniques was confirmed by recorded material which displayed strong, coherent and characterful spatiality which strongly suggested auditory intimacy and close proximity to sound objects. These characteristics are also observable in sound materials resulting from extensive processing and consequently in the two compositions themselves. The signification of the musical text appears to have benefited by a perceived increased tangibility of sound materials employed here as a direct result of this approach. If one is to consider the reception of this work as an indicator of quality and /or clarity of musical meaning, a more holistic approach to recording and working with acoustic space might provide some of the answers in the quest for "something to hold on" [20] in electroacoustic music.

Acknowledgments

The author would like to thank Michael Ward and Sam Mitchell at Leeds Beckett University for their help and invaluable insight in the development of the multichannel arrays, Johannes Schütt at ICST for his guidance and advice and Dr Vaios Tsiakoumis for the design of the casings.

[1] 1st Prize, International Electroacoustic Composition Competition "Iannis Xenakis", Contemporary Music Lab of Aristotle University, Greece.
Electronic Music Category Winner, The New Music Consortium, University of South Florida, USA.
1st Prize - Acousmatic Category, IX° Foundation Destellos Competition 2016, Argentina.
2nd Prize, KLANG! electroacoustic composition competition 2016, France.
3rd Prize - Résidence ICST-Zurich,Concours International de Composition Electroacoustique de Monaco.
Honourable Mention, 8ème concours biennal de composition acousmatique Métamorphoses, Belgium.

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