EMBODIED LISTENING, AFFORDANCES AND PERFORMING WITH COMPUTERS

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ABSTRACT

I consider here some contemporary approaches to the live performance of music. Drawing upon ideas of the embodied mind and the extended mind, I will outline a theory of embodied listening which problematises some of our assumptions about music, gesture and performance. Against the background of this theory, I will argue against approaches which put too great a focus upon gestural legibility in when design new computer-based instruments. I will consider a diverse array of practices in contemporary instrument design which do not necessarily adopt principles of gestural legibility, and challenge some of our ideas about what instruments and musical performance should be. I draw upon the notion of affordances, and argue in favour of an approach to computer based instrument design which seeks to explore the unique affordances and singular possibilities we find in new technologies.

1. INTRODUCTION

The relationship between computer music and the live presentation of music is complex and riddled with anxieties. The tape music and electroacoustic traditions embraced the static playback of precomposed pieces, with no pressure on a composer to ‘play it live’, often because the studio processes and existing computer technologies rendered this technically difficult if not impossible. However, the design of new musical instruments or systems for the live performance of computer music has been a continual and continually growing issue of concern and area of research within computer music. These instruments might use microprocessors or computers coupled with sensors and controllers. Nowadays, easily hackable consumer devices such as the Kinect or Nintendo Wii, along with a huge market for control surfaces, such as the Akai orReason controllers for instance, might take an exploratory interaction with it to discover new affordances, such as the case when the extended playing techniques of musicians such as Keith Rowe or Evan Parker reveal new sound worlds for the guitar and the saxophone respectively.

3. THE EMBODIED MIND

Contemporary fields of research such as artificial intelligence and cognitive science have brought us to challenge earlier models of a mind/body dichotomy and raised questions about the nature of cognition, perception and reasoning. An increasing amount of evidence suggests that the mind is best described as ‘embodied’ and that many of our ideas about what instruments and the sort of music and performance practices that we might expect to emerge from them. Furthermore, exploratory improvisations with such instruments might reveal hidden affordances, such as the case when the extended playing techniques of musicians such as Keith Rowe or Evan Parker reveal new sound worlds for the guitar and the saxophone respectively.

In order to consider the role of gesture, I will discuss the embodied nature of our musical encounters: listening is not just in the ears or mind, but involves the whole body and the instrument one plays. I will use this theoretical background to investigate any over focus on ‘gestural legibility’ in new instruments, suggesting instead that body movements are part of the totality of a musical performance, and it does not matter if they can be clearly seen to trigger or modulate sounds. It will be argued that such a focus on ‘gestural legibility’ may act to hinder explorations of the potentials of new instruments, and that we must approach them on their own terms rather than shoeorning them with preconceived ideas of what music and performance should be. Drawing on the concept of ‘affordances’, I will consider new instruments and technologies as possessing unique affordances and singular qualities which we can seek out if we approach them with sufficient openness, and without overly restrictive notions of what music, listening and performance are.

I will then look at some contemporary performance practices, not all of which involve computers, which are able to harness these unique, singular affordances of certain objects and technologies, and as such productively inform the design of computer-based new musical instruments.

2. AFFORDANCES

This paper draws on James Gibson’s notion of affordances, along with William Gaver’s notion of hidden affordances, concepts which perhaps require a little initial explanation before they are deployed. The concept of affordance was created through psychologist James Gibson in 1977, and has since migrated to various fields, including Human Computer Interaction and Interaction Design. Gibson describes affordances as follows, ‘The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill.’[12, p. 127] Affordances are not necessarily manifest or perceptible, unlike more quantifiable properties. William Gaver, has added to this notion of hidden affordances, those affordances that are often only discovered through random, improvisatory, exploratory interactions. A pivoting door handle, for instance, clearly affords grasping, but it might take an exploratory interaction with it to discover affordances of turning the handle. And in the limbs, not localized in the limbs, localized in the limbs and in particular the musical environment; when using a tool or technology, the human body becomes part of a coupled system, the totality of which should be seen as a cognitive process even if it is not contained to the head.[8]

Not only are our cognitive processes grounded in the body, but moving the body (or further acts of perception) can be an active part of these processes; moving and thinking can be co-constructed as being embedded within each other and the ways in which we move our bodies can be construed as playing a role in the way we generate meaning in our everyday behaviours. In this way, our environment and the tools we use in that environment can be seen as coupled with and part of our cognitive apparatus.

4. EMBODIED LISTENING

These ideas of embodiment have implications for how we think about listening and to playing music. Wayne Bowman asserts that research in embodiment may offer strong grounding for claims about the central role of the body in musical experiences, suggesting that if listening to and playing music activates the same neural circuitry as bodily movement, then the bodily movements we associate with music should be seen as a fundamental part of what music is.[2, p. 50]

Embodiment and extension theses also suggest that we must recognise that listening involves more than just the ears or body, but the whole bodily systems and nodes of reason, rather than shoehorning them with computers, which are instruments we might work with. The way in which we move when we encounter sounds and the way we move when we explore and play instruments can be seen as part of the cognitive processes involved in the perception and cognition of music, not just something superficial or even something communicational, but part of how we generate meaning in our musical experiences.

An interesting example of symbolic off-trading in music perception and cognition comes from a study of capoeira by ethnomusicologist Greg Downey. He describes watching a performance, observing the non-participating musicians playing along on their own phantom instruments, tapping fingers and hands, and how this was never simply tapping along to the rhythm, but would involve complex counter-rhythmic layers. He writes, ‘[The] incorporation of bodily skill conditions a participant simultaneously to hear the rhythm being played by another and to feel different, complementary rhythms or variations emerging from his or her own fingers and hands.’[10, p. 498] The movements of the practitioners were not simply ‘on the beat’, but falling in between the beats, as the music is experienced and reconfigured through the body. These movements are to be seen as a part of the embodied process of listening whilst dancing or playing upon these instruments are embodied in the body. Music becomes gesturalized in the limbs, localized in the limbs, in relation to the ears and mind, and listening and moving becoming intimately intertwined.
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3. THE EMBODIED MIND

Contemporary fields of research such as artificial intelligence and cognitive science have brought us to challenge earlier models of a mind / body dichotomy and raised questions about the nature of cognition, perception and reasoning. An increasing amount of evidence suggests that the mind is best described as ‘embodied’ and distributed across the whole body and neural structures with which we perform complex reasoning [14]. Secondly, aspects of cognition are better understood when we don’t limit our studies to the brain, but consider the interactions between our bodies and environments. [8, 27]

Cognitive processes can be seen to be routed in our lives as practices. Psychologist Margaret Wilson, for instance, writes, ‘Mental processes that originally evolved for perception or action appear to be co-ordinated and run “off-line”, decoupled from the physical inputs and outputs that were their original purpose. They assist in living and knowing.’ As Wilson notes how explicit counting on fingers can become mere subleaves of knowing we can ask just the priming of motors programs but no overt movement. [27, p. 633] Similar conclusions emerge from the works of cognitive linguists George Lakoff and Mark Johnson in their assertion that ‘The same neural and cognitive mechanisms that allow us to perceive and move around also create our conceptual systems and nodes of reason… Because our conceptual systems are a part of our bodies, meaning is grounded in and through our bodies.’ [4, p. 4-6] This idea that the neural structures which we use for perception may also be used for more complex cognitive tasks suggests that our ability to reason and even the way in which we move when we encounter sounds and the way we move when we explore and play instruments can be seen as part of the cognitive processes involved in the perception and cognition of music, not just something superfluous or even something communicational, but part of how we generate the musical experience.

An interesting example of symbolic off-trading in music perception and cognition comes from a study of cappoira by ethnomusicologist Greg Downey. He describes watching a performance, observing the non-participating musicians playing along on their own phantom instruments, tapping fingers and hands, and how this was never simply tapping along to the rhythm but would involve complex counter-rhythmic layers. He writes, [The] incorporation of bodily skill conditions a practitioner simultaneously to hear the rhythm that is being played by another and to feel different, complimentary rhythms or variations emerging from his or her own fingers and hands. ‘[10, p. 498] The movements of the practitioners were not simply ‘on the beat’, but falling in between the beats, as the music is experienced and reconfigured by the body. These movements performed without being heard as a response to the sound after it has been listened to, but as part of the listening process. Downey suggests that within the context of people who have acquired instrumental or dancing skills, the process of listening whilst dancing or playing upon these instruments are embodied in the body. Music becomes ground to the body, realized only in a relation between the ears and mind, and listening and moving becoming intimately intertwined.
Of laptop performances, it has become a somewhat tired cliché to say ‘he could’ve just been checking his email’. Tired, but powerful nonetheless, and forever haunting laptop performances, are approaches taken in digital instrument design. In a paper given at NIME, Takuro Lipitt (aka DJ Sniff) of STEIM research centre in the Netherlands describes some of the rational behind his own ‘insensible-ability’ set-up as being influenced by the ‘illegibility’ of laptop performances; ‘Building a system that was coherent to the audience was my strong motivation’.

This was a reaction to the typical laptop musician and performance that was becoming prominent at the time. [15, p. 73] Another NIME paper discussing digital instrument design situates laptop performances as the flawed model against which digital instrument designers must work, ‘Writing. These performances can lack a sense of active listening, as well as a visual connection between the performer’s actions and the audio output [...] A disconnect exists between the ostensible producer of the music and the music itself: there is no visible causal link apparent between the performer’s gestures and the resulting audio’. [28, p. 168] For many, the problem is located in the lack of a moving body being seen to cause sound with gesture. Instrumental gestural understanding in terms of a moving body ‘causing’ sound, is seen as essential to an audience’s experience of a performance. Even Miller Puckette, the creator of Pure Data and hence perhaps a ‘godfather’ of live laptop performances suggests that some sort of gestural legibility would help in this context. With this weight of consensus against them, rarely does a performer want to be seen playing his music motionless behind a laptop, even if the music was composed whilst motionless even if reproducing it live demands little more than being motionless behind a laptop. Extending computer music through new interactive design criteria, in most cases, is often informed by attempts to create and perform ‘gestural legibility’, linking a moving body to sound creation or modulation.

What I will call, after Kim Cascone, the ‘concert hall tradition’ - having a performer or group of performers playing on some sort of stage to an entirely separate, attentionally engaged audience (as opposed to the way that goes beyond the perceived confines of 4/4, and the DAW asserting the naturalness of repetition, affording as it does such easy copy-pasting [18]) - might add to Magnusson’s list that the ‘New Gestural Interface’ tells us ‘music should contain events and gestures!’ and thus expect to hear the traces of these design criteria in music performed upon such instruments. Simon Waters notes, ‘what musicians tend to be interested in and good at is using the other hand, foreground a ‘constrained interactive capability’, ‘engendering of complex music’ and ‘expressivity and virtuosity’, ‘Infra instruments’, on the other hand, foreground ‘infrastructure’, ‘a constrained interactive capability’, ‘engendering of complex music’ and ‘expressivity and virtuosity’. ‘Infra instruments’, on the one hand, focus on such things as ‘repeatability’ and ‘reusability’. Of laptop performances, it has become a somewhat

Further to this, Corness notes the way in which particular virtuoso performers are known for making their playing look easy. An understanding of how difficult a piece is, or how skilled a performer is at playing it, often relies on an understanding of both piece and instrument that many audience members do not possess anyway. During classical or rock concerts, a significant proportion of the audience will be watching the performers and move their bodies as the performers are moving and creating sound: the actual hand movements of a virtuoso pianist may only be as clear as those of a virtuoso laptop musician. As Corness suggests, a lot of people’s awareness of instruments and performances may be reliant upon acceptance of cultural norms and familiarity [6]. The laptop is an established performance tool, far harder to check emails on than a laptop, wildly inefficient for word processing or computing, whilst the laptop enters the performance on the stage accompanied by the stigma of being merely a jumped-up calculator.

Not only is ‘gestural legibility’ a problematic concept, but using it as an axiomatic principle rules predetermining the way in which new instruments are used and thus foreclosing avenues of exploration of their unique possibilities. The instrument itself, as well as the myriad codes of the concert hall, shape the music performed and the nature of the performance: as Thor Magnusson observes, instruments contain ‘knowledge systems’ and ‘design, such as the piano keyboarded telling us of the unimportance of microtonality, the drum-sequence telling us how natural 4/4 rhythms are, and the DAW asserting the naturalness of repetition, affording as it does such easy copy-pasting’. [25] Nonetheless, the majority of users of a DAW sequencer open up the possibilities of minute and of course, as Simon Waters notes, ‘what musicians tend to be interested in and good at is using devices in a manner which operates at the edges of or outside the design brief’. [26] Musicians may often subvert the ‘design brief’ and explore hidden affordances, the unexploited reservoirs of potential that these instruments possess. The piano affords being opened up and prepared in a Cagean manner, or extended to just-intonation as La Monte Young on The Well Tuned Piano did; Autechre use volume data from analogue synthesizers in unusual ways that go beyond the perceived confines of 4/4, and the DAW sequencer opens up the possibilities of minute and precise control of sounds, such that there is never any resistance, whereas the majority of users of a new gestural interface might be channelled into making gestural music, and whilst this isn’t a problem in and of itself, it risks foreclosing explorations of the unique and perhaps non-gestural potentials of these technologies.

As Francisco Lopez notes, the values and hierarchies of the concert hall tradition that result in an emphasis on gestural legibility tend to prevent electronic performance practices from being assessed on their own terms and from realising their potential. Lopez conceives of a ‘breakthrough in music of perhaps historical proportions’ that we might find in electronic instruments but that is hampered by a blind following of tradition [16]. Instead of trying to fit new instruments into our notions of what music and performative art is, we might explore the new affordances they may have. We can now consider some approaches which do not rely on follow-up trenches, instead approaching new instruments for their unique affordances.

6. ALTERNATIVE MUSICAL INSTRUMENTS

John Bowers, Phil Archer, John Richards and Simon Waters are amongst contemporary performers, instrument builders and theorists who move away from a focus on such things as ‘repeatability’ and ‘perfectibility’, instead introducing elements of instability, unpredictability and amazement into their performance set-ups. These individuals break away from approaches which use one element of the performance - such as gestural legibility - as an index of musical quality. Archer and Archer have an ‘infra instruments’ project, which posits itself against MIT’s ‘hyperinstruments’, the latter being a project which emphasise concepts such as the instrument’, learnability and refined technique. Hyperinstruments are facilities for facilitating an axiomatic principle: ‘engendering of complex music’ and ‘expressivity and virtuosity’. ’Infra instruments’, on the other hand, foreground a ‘constrained interactive capability’, ‘engendering of complex music’ and ‘expressivity and virtuosity’. ‘Infra instruments’, on the one hand, focus on such things as ‘repeatability’ and ‘reusability'.
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performance. Toshimaru Nakamura is one such improviser, who plays the ‘no-input mixing desk’ (a mixing desk connected back into itself in a web of feedback loops) and attached to a sampler with an empty memory, producing only sustained sines, says of her contemporary, ‘I think these musicians’ focuses are on hearing the sound, not physically playing musical instruments, because the instrument is an obstruction. They just want to listen more to the sound.’ [1]

Whilst these infra instruments may not involve computers, the way in which they challenge the notion brought to computer-based musical instrument design is of great value, and the models for performance and musical interaction that they open up should be examined. David Toop further considers the absence of the performing body amongst laptop improvisers, seeing it partially rooted in the sound-world they often choose to inhabit, and being bound up with what he sees as a new mode of listening, describing a shift away from observable physical technique and an immersion in considered listening and attention to the sound of sounds, and the precise placement of sounds. [24] These musics challenge the ideas that gesture and event are essential qualities of music making, reasserting music making and listening as multiple, diverse activities, which may then allow for an exploration of the novel possibilities of new technologies on their own terms. It can sometimes be the constraints of new instruments that we find some of their singular qualities that are worthy of exploration and may help us realise what Lopez describes as the ‘most important and most breathtaking in music of perhaps historical proportions’ [16] These constraints may only be constraints when observed from the aspect of traditional modes of performance. However, it may be something that can be exploited and expanded upon for even desirable quality of the laptop. In ‘Simple Interfaces to Complex Sound in Improvised Music’, John Bowers and Sten-Olof Hellström focus on ‘feature/bug was the starting point for my piece bandooneonbook, which filters and tunes the feedback through a mushpatch, controlled by the keyboard and makes it dynamically playable via opening and closing the lid. [13]

Another, perhaps more obvious quality of laptops (and computers in general) is the absence of physical effort and gesture needed to produce and sustain sound, a ‘detachment’ or ‘detachment’ that many interfaces try to overcome, for it is seen by many as one of the key problems with the laptop in a musical context. However, it may be something that can be exploited and expanded upon for even desirable quality of the laptop. In ‘Simple Interfaces to Complex Sound in Improvised Music’, John Bowers and Sten-Olof Hellström focus on ‘feature/bug was the starting point for my piece bandooneonbook, which filters and tunes the feedback through a mushpatch, controlled by the keyboard and makes it dynamically playable via opening and closing the lid. [13]

As our thesis of extended listening suggests, the moving body remains an important part of the totality of the performance even if it is not triggering or modulating sounds. There is a powerful suggestion for instrument design, then, in Bowers’ and Hellström’s work: we can think instrument design not just in terms of what movements produce sounds, but in terms of those movements can make the computer without modifying or producing sounds, movements that are still an essential part of the totality of the performance. The laptop clearly contains an ‘expressive latitude’, for when it is not coupled to an interface or sensors, many of the performer’s movements will not be translated into sound, and the body might be seen to be playing a role of the ‘source’, rather than the ‘player’. Thus Ryan from STEIM points out this ‘distance’ provided by a computer would be construed as desirable by a certain strand of thought within compositional practices, describing how in this last century a great deal of effort has gone into distancings techniques for musical composition, evidenced in the Serialists, John Cage and post-war experimental musics, trying to limit certain techniques, habits or romantic self-expression. [21]

The distance that the computer provides, ignoring the expressive physical gestures of the performing body, can be seen as a positive thing, mediating gestures that we don’t always want to translate into sound.

7. CONCLUSION

In approaches to the design of computer based musical instruments, I argue that we must avoid a reductive focus on ‘gestural legibility’, because the theory of embodied listening that I have outlined here suggest that the role played by gesture and the body can still have musical meaning even if it is decoupled from causing sound. Being able to see a moving body trigger or modulate sound must be seen as only one aspect of the way in which a performer’s movement might function in the totality of a performance, and whilst clear causal links between physical gesture and musical event can be valuable in their contribution to the performance, placing too much emphasis on this gestural legibility takes attention away from many of the other things that make up the totality of a musical performance. We must instead open ourselves to the many different modes of performing and listening.

Contemporary performance practices which abandon pianos and guitars in favour of laptops, biosensors, digital modeling and digital technologies should not be judged on the basis of what they lack in relation to older instruments and practices, but on the basis of their unique and singular capacities: unique affordances which might manifest themselves as apparent constraints or flaws if we are assessing the instrument on the basis of traditional practices. When designing computer based musical instruments, we should critically consider what it is that makes a performance interesting, a gesture meaningful, and attempt to engage with the affordances of computers, rather than blindly accepting traditional instrumental paradigms.

8. REFERENCES


performance. Toshimaru Nakamura is one such improviser, who plays the ‘no-input mixing desk’ (a mixing desk connected back into itself in a web of feedback loops) who placed the importance to him of keeping very still when playing, because he feels that this is natural and honest Sachiko M, another minimalist improviser is a sampler with an empty memory, producing only sustained sine tones, says of her contemporaries, ‘I think these musicians’ focuses are on hearing the sound, not physically playing musical instruments, because the instrument is an obstruction. They just want to listen more to the sound.’ [1].

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Whilst rooted in DIY electronics and in some ways the polar opposite of Powerbook sterility, John Richards’s practice suggests different and useful ways in which we might consider the laptop – and computers in general – in performance. He inverts the design ideas which try and model the instrument around the needs of the performer, instead effectively considering the instrument as an ‘actor’, looking at the way in which an instrument, through its affordances and constraints, can impose certain manners of the performer, writing, ‘Rather than thinking in terms of "mapping gesture," the design of electronic devices and their position on, for example, a tabletop can act as a way of dictating gesture and body movement in performance.’ [20, p 30]

Following Richards, we might consider laptops not as being limited, but rather as dictating certain body movements, gestures and singular ways of playing that we might embrace. A particularly poetic investigation of the singular nature of the laptop as an instrument, allowing gesture and bodily movement to be directed by the device in a decidedly elegant way, is Hans Koch’s bandoonoonbook, which emerges out of a search for such singularities and utilises the specifics of a certain model playing it in a manner not too far from a ‘squeezobes’:

is it possible to find -besides clockspeed, cpu-power, more bit-depth on the ad/ad converters, etc.- something specific to a certain machine, which can pass as an instrumental quality for that model [...] my research focuses on hardware-specific aspects of certain powerbooks and then goes on to make them playable with max/msp patches and interfaces [...] when apple introduced the titanium-powerbook series in 2001, the heralded big progress came with some minor sacrifices (no more audio-in) and one very special design flaw: the microphone was put directly next to the left speaker and thus merrily feedbacking along with its fellow speaker as soon as one tried to use both. This sweet little feature/bug was the starting point for my piece bandoonoonbook, which filters and tunes the feedback through a mxpatch, controlled by the keyboard and makes it dynamically playable via opening and closing the lid. [13]

Another, perhaps more obvious quality of laptops (and computers in general) is the absence of physical effort and gesture needed to produce and sustain sound, a ‘distance’ or ‘detachment’ that many interfaces try to overcome, for it is seen by many as one of the key problems with the laptop in a musical context. However, it may be something that can be exploited and expanded upon: the non-physical and even desirable quality of the laptop. In ‘Simple Interfaces to Complex Sound in Improvised Music’, John Bowers and Sten-Olof Hellström bring to the concept of ‘expressive latitude’ as a principle in instrument design, favouring devices which are not continually coupled to the body and its gestures, leaving the body free to do without modifying or producing sounds, movements that are still an essential part of the totality of the performance.

As an example of embodied listening suggests, the moving body remains an important part of the totality of the performance even if it is not triggering or modulating sounds. There is a powerful suggestion for instrument design, then, in Bower’s and Hellström’s work: we can think instrument design not in terms of what movements produce sounds, but in terms of those movements the performer can make, without modifying or producing sounds, movements that are still an essential part of the totality of the performance.

The laptop clearly contains an ‘expressive latitude’, for when it is not coupled to an interface or sensors, many of the performer’s movements will not be translated into sound, and the body might be seen to be at a certain ‘distance’ from the sound-world. Joel Ryan from STEIM points out that this ‘distance’ provided by a computer would be construed as desirable by certain strands of thought within compositional practices, describing how in this last century a great deal of effort has gone into distaining techniques for musical composition, evidenced in the Serialists, John Cage and post-war experimental music, to limit range of compositional techniques, habits or romantic self expression. [21]

The distance that the computer provides, ignoring the expressible physical gestures of the performing body, can be seen as a positive thing, mediating perhaps the gestures that we don’t always want to translate into sound.

7. CONCLUSION

In approaches to the design of computer based musical instruments, I argue that we must avoid a reductive focus on ‘gestural legibility’, because the theory of embodied listening that I have outlined here suggest that the role played by gesture and the body can still have musical meaning even if it is decoupled from causing sound. Being able to see a moving body trigger or modulate sound must be seen as only one aspect of the way in which a performer’s movement might function in the totality of a performance, and whilst clear causal links between physical gesture and musical event can be valuable in their contribution to the performance, placing too much emphasis on this gestural legibility takes attention away from many of the other things that make up the totality of a musical performance. We must instead open ourselves to the many different modes of performing and listening.

Contemporary performance practices which abandon pianos and guitars in favour of laptops, biosensors, driftwood and hollowed out turnips should not be judged on the basis of what they lack in relation to older instruments and practices, but on the basis of their unique and singular capacities: unique affordances which might manifest themselves as apparent constraints or flaws if we are assessing the instrument on the basis of traditional practices. When designing computer based musical instruments, we should critically consider what it is that makes a performance interesting, a gesture meaningful, and attempt to engage with the affordances of computers, rather than blindly accepting traditional instrumental paradigms.

8. REFERENCES


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SOUND LABYRINTH: EXPLORATION OF THE EMBODIED SUBLIME THROUGH AN IMMERSIVE AUDIO/VISUAL INSTALLATION

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ABSTRACT

As immersive audiovisual technology continues to mature and become commercialised, the creation of sophisticated interactive systems that previously required significant infrastructure and funding comes within reach of the solo artist. With the ready availability of motion tracking systems like the Microsoft Kinect, and the proliferation of software components for creating immersive media environments, the challenge of audiovisual installation work is more than ever focused on addressing deeper conceptual issues, rather than solving technical problems.

Through the use of both representational and abstract audio, immersive sound spatialisation, multi-channel video, and the incorporation of gesture-based interaction, SoundLabyrinth applies theories of gesture within electro-acoustic composition, and theories of movement analysis and embodied music cognition, to the examination of the boundaries between virtuality and embodiment, transcendence and immanence, as an exploration of the “sublime within the everyday”.

1. INTRODUCTION

Immersion and interaction are two key objectives propelling digital art, requiring bigger screens, head mounted displays, multi-screen projections, 3D visualisation systems, ever more realistic rendering systems, and multi-channel surround sound systems that place the listener in the scene. Likewise the quest for interactive media has matured from keyboard-driven text adventures, to body sensing motion capture systems, including high fidelity systems such as Vicon-8 [10], through to domestic gesture tracking systems like the Microsoft Kinect.

While a thorough examination of the use of gestural interfaces within immersive installation practice is beyond the scope of this paper, it is worthwhile briefly touching on key developments and concepts. SoundLabyrinth draws upon the concepts and techniques of the now common immersive CAVE system [8], although with greater emphasis on immersive sound than fully immersive visuals, as described in Section 3. Such immersive environments are often experienced as trance-like, meditative, or mentally absorbing [11, p. 199], and as such, are more suited to the goals of SoundLabyrinth than a more open gallery architecture.

The other key development utilised by SoundLabyrinth is the natural body interface. By removing the need for any form of physical control apparatus, the distance between the participant and the virtual world of the artwork is reduced, heightening both the immersive quality of the work, and the sense of the participant’s embodiment within the work [ibid]. As a work exploring the interface between the embodied and the virtual, this distance reducing, boundary blurring technology is of great conceptual importance.

Rapid increases in available computing power, and the ubiquity and variety of user interface systems has reduced the cost of developing immersive environments. This readily availability increasingly enables work in this medium to explore conceptual issues, rather than focus on overcoming technical problems.

In the following sections, I first explore the conceptual and aesthetic issues which SoundLabyrinth seeks to address, before turning to a description of the work itself, the specific design strategies employed, and finally reflections upon the end result.

2. SUBLIME SOUND: EXPLORING THE SPECTRUM OF REPRESENTATIONAL AND ABSTRACT AUDIO

2.1. The sublime in (sound) art

This work arises from my desire to use sound as an artistic medium for exploring the sacred, not in an overtly religious sense, but in the sense of the (transcendent) sublime: “that which is beyond the senses”. Although having roots in antiquity, the concept of the sublime as an aesthetic polarity in contrast to beauty was most directly expounded by Edmund Burke[5]. Kant takes up this theme in A Critique of Judgement [12], noting that beauty “is connected with the form of the object”, having “boundaries”, while the sublime “is to be found in a formless object”, typified by “boundlessness”.

Schopenhauer [19] further developed Kant’s concepts of beauty and the sublime, in which the sublime lies beyond the subject’s ability to either physically cope with or mentally perceive or even