Game Sound Technology and Player Interaction:
Concepts and Developments

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Chapter 3
Sound is Not a Simulation:
Methodologies for Examining the Experience of Soundscapes

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ABSTRACT

In order to design a computer game soundscape that allows a game player to feel immersed in their virtual world, we must understand how we navigate and understand the real world soundscape. In this chapter I will explore how sound, particularly in urban spaces, is increasingly categorised as noise, ignoring both the social significance of any soundscape and how we use sound to interpret and negotiate space. I will explore innovative methodologies for identifying an individual's perception of soundscapes. Designing virtual soundscapes without prior investigation into their cultural and social meaning could prove problematic.

INTRODUCTION

Simmel (as cited in Frisby, 2002) argues that the exploration and navigation of a space, particularly an urban space, impacts all of the human senses. Equally he suggests that when exposed to multiple inputs of both internal and external stimuli, we make choices, such as movement and interaction, based on the sensory information of a given space (Simmel, 1979). In the design of gameworlds, we must examine this concept of sensory input as both a method of navigation and socialisation.

Within a real world all the senses are exposed to information, sight, sound, smell, and touch. Within a gameworld, we are currently exposed to an overriding visual experience and minimal sound information. There is a deficit of sensory information occurring within this digital world and, as more people move towards gaming and virtual communities, this deficit must be examined. For digital virtual worlds to create a convincing immersive experience with the technology that is available, we must explore sound as well as sight in the construction of gameworlds from a sociological perspective.

Thompson (1995) argues that when we enter virtual spaces or communities we leave orality behind: he sees no space for sound within virtual worlds or online communities. It has been prevalent in social and media theory to ignore the experience of sound in a space, whether that sound is produced by human activity or by other natural sources. It is my argument that sound plays a part in the social construction of space, whether real or virtual, either by its presence or absence. Equally, I will argue that sound which is produced by objects through reverberation and other acoustic qualities can affect how we navigate or place meaning in a space.

I will also explore the process of control which is dominating research into the Soundscape, this is primarily due to an increasing awareness of the side effects or apparent dangers of loud sounds on people.

The need to monitor and control sound in the environment has become a predominant research focus within soundscape studies. Sounds within urban centers are increasingly seen as a by-product of industry and technology: this has led to the creation of noise policies within a number of countries. Sound is increasingly seen as a measure of sound pressure levels rather than being seen as a social structure (Blesser & Salter, 2009, pp. 1, 2). This is significant for sound designers who wish to gather data on the meaning of sound within society. If a sound designer considers sound only in relation to volume, noise, or other objective criteria they might ignore the meaning sound beyond its output level. In looking at the social and perceptual aspects of sound we are constructing what Feld (2004) would call an *acoustemology* of the sound world. He increasingly acknowledges that soundscape studies, which react to human interventions to the natural soundscape, ignore cultural systems which develop as a result of being immersed and surrounded by sound.

The game space, or any virtual space which asks a person to become immersed in it, needs to be founded upon an understanding of the sociologi-cal impact of sound on the individual and society. A game designer must also take into account the more abstract representation of sound that is experienced in art, cinema, and other mediated spaces. There is already a history of the experience of sound through mediatisation (Bull, 2000; Cabrera Paz & Schwartz, 2009; Cohen, 2005; Drobnick, 2004): the difference between these theories and the theory of game sound design is the concept of immersion, interactivity, and simulated reality.

What describes a soundscape, who defines the description and what models are used to categorise levels of sound and their meaning? There are no set methods for the study of acoustic ecology or the soundscape from a sociological perspective. I propose an interdisciplinary method which will draw on social theory, media theory, and sound design. In order to explore the soundscape we must incorporate different methods and theories to analyze the social impact of the soundscape, real or virtual on the individual and the group.

THE EXPLORATION OF THE SOUNDSCAPE

Some of the earliest documented exploration of the modern soundscape arose from within the arts and modern music composition. Those who practised the art of listening explored the changes in our early soundscape, technology was seen to change our soundscape, but this was not seen as a negative event (Luigi Russolo's 1913). Luigi Russolo's 1913 manifesto, *The Art of Noise*, posited that sound had reached a limit of invention, technological sounds allowed for an "enjoyment in the combination of the noises of trams, backfiring motors, carriages, and bawling crowds". He argued that in listening and using these sounds as types of music we would create an awareness of the rapidly changing soundscape. In an ever changing technological climate, we would increasingly be exposed to new types of sounds at a faster rate than at any time preceding mechanisation. The

soundscape would also play a much stronger part in the construction of music and sound art with the introduction of audio recording devices.

However over time this modern soundscape became less a usable musical landscape or instrument and more like an environmental pollutant (Bijsterveld 2008). Bijsterveld (2008) argued that technology became a symbol of the loudness and unhealthy character of the urban soundscape.

Schafer's examination of the soundscape in the 1960s was guided by an awareness of the increased levels of sound within urban centers as well as (Cohen, 2005; Schafer, 1977). He argued that the spread of industrialisation, polluted not only such physical spaces as water and land but the hearing space, leading to an alteration of the perceived space for animals and humans. Sound, or what was now being called noise, was increasingly seen as a negative side effect of industry. Schafer's research focused on a reification of past soundscapes and the preservation of soundmarks (similar to historic landmarks). The World Soundscape Project, established by several people including Murray Schafer, in the late 1960s, proposed a practice of recording the landscapes of different spaces around the world. They wanted to record and archive certain landscapes they felt were being transformed as a result of a noisier soundscape. These recordings would then highlight the effect that increased sound levels were having on certain spaces.

Although Schafer brought the sound world into the equation as a factor within industrial change, very little focus has been on the positive aspects of contemporary soundscapes or their social meaning. Human activities produce sound, we are also embedded in sound, space becomes revealed to us through sound and, as spaces become more built up or newly transformed our ability to see beyond our immediate space becomes limited. Blesser and Salter (2009) argue that sound allows us to envision our space; a space becomes revealed to us through its "aural architecture". They examine the ability of humans to restructure their sound environment, to act back on loud sound spaces and argue that because constructed spaces remain static it is through social behaviour that we have the ability to modify our sound arena.

The Designed Space

De Certeau (1988) argues that the city is a representation of political economy, historical narrative and social forces of capitalism and while architects and planners see the whole, the vista, the individual who lives and works in the city will never see it in totality. He suggests that we walk the city blindly, reconstructing our own narratives of space. De Certeau implicates sound without referencing it as a way to see an invisible whole. He argues against the rationalising of the city or functionalist utopianisms, allowing for the transformation of space by those that live within it. Adams et al (2006) suggest that "a soundscape is simultaneously a physical environment and a way of perceiving that environment" (Adams et al., 2006, p. 2). They see the soundscape as a construct through which we will navigate. Adams et al. and de Certeau understand that the construction of space and our ability to navigate through it is dependent on more information than the visible.

In recreating the soundscape in digital landscapes, the designer pays homage to the real world she tries to replicate: she codes, intentionally or not, the universalisms of design into the construction of her virtual space. The space is built to replicate the reflection of sound against object, as if this is the only way sound moves through space or equally the only way we perceive it. She is equally guided by the epistemology of sight as the "the epistemological status of hearing has come a poor second to that of vision (Bull & Back, 2004, p. 1). Like any other visual medium, the design makes assumptions on how sound should be perceived in any constructed space. This functional approach only measures our potential physiological responses to sound. It does not explore the individual or community experience of sound or

the subjective and immersive experience of time and space through either real world listening or mediated listening.

Augoyard and Torgue (2006) theorize that sound may guide social behaviours: they argue that no sound event can be removed from "spatial and temporal conditions" and that sound is never experienced in isolation. They have adopted qualitative approaches to the exploration and analysis of sound in urban spaces. Augoyard and Torgue argue that the term "soundscape" is tied to a certain empirical model of measurement which may be too narrow in its meaning, belonging more to a textual rather than observational critic of "acoustical sources" and "inhabited spaces" (2006, p. 4). They suggest that the term *sonic effect* better describes the experience of sound within space. It breaks the analysis of sound into three distinct fields: "acoustical sources, inhabited space, and the linked pair of sound perception and sound action" (Augoyard & Torgue, 2006, p. 6). Each of these fields are required in order to examine the ubiquitous nature of the soundscape as a process which impacts on social, physiological as well as psychological behaviour.

What is most difficult to analyse, but fundamental to the soundscape design is the subjective experience of sound. When constructing a virtual landscape, the primary consideration is—and for a number of games it is the only goal—the reaction time of game player interaction: if I shoot, will I hear the sound of gunfire instantaneously?

MEDIATED LISTENING

The numbers of people turning to electronic devices (mp3, walkman, ipod, mobile games, and laptops) as a means of shutting out real world sounds has increased exponentially in the last decade (Bull, 2000). The personal headphone has played a part in reconfiguring the landscape, allowing us a choice in how we perceive our world and how we are perceived as taking part in or stepping out

of real time and space. Thompson (1995) explores the change in perception of "spatial and temporal characteristics of social life" (Thompson, 1995, p. 12) due to the development of communications technology. He recognises that the role of oral traditions has changed: face to face contact is eliminated in favour of virtual communications. Bull (2000) argues that mediated listening is now used as a means to escape the "urban overload" of our cities and suggests that the use of mobile technology for listening to the radio or to music collections affords a breather or a meta-physical removal from the real world. How we shift between these acoustic environments, and how our personality and behaviour may be manipulated, both by our apparent control of one type of space and our lack of control over another, may affect social patterns of relating to each other and the world we inhabit.

Sound Control

Research has shown that the reasons for putting on headphones are motivated by numerous factors, such as (Bull, 2000). Erving Goffman's (1959) theory of *civil inattention* addresses this concept. He examines the unwillingness of the individual to be seen in public spaces and explores the notion of contexts structuring "our perception of the social world" (as cited in Manning, 1992, p. 12). Goffman suggests that social spaces are framed and, within these frames, we act a certain way. How we act is perceived as being the acceptable or normal behaviour for those spaces and he uses the example of the elevator space: when travelling in such a confined space, the "normal" behaviour is to look anywhere but at another person's face. Mediated spaces contain their own framed context. When we engage in a fully immersive experience, such as gaming or mediated listening, even if this happens in a public space we are not seen to be ignoring the real world. We are seen to be engaged within another space, one which requires our full attention.

Bull's (2000) research also highlights how the perception of time becomes distorted when listening to personal headphones. For some, listening is required to manage the boredom of "slow time". It is also used to negotiate a path through space, a path which is experienced through a virtual soundscape or soundtrack and this alters the listener's perception of time. Bull's studies have revealed that time is almost always a reason for engaging in mediated listening. This concept of controlling space and time, through mediated listening, suggests that the senses required for listening extend beyond simply hearing. If the experience of listening alters the perception of time and space then reality also becomes less fixed and more flexible. Lefebvre (2004) argues that time and the everyday life exists on multiple levels and that the experience of time contains a value coding, depending on the task being done. He suggests that time is both fundamental and quantifiable and that quantifiable time is an imposed measure which is based on the invention of clocks and watches. When engaged in mediated listening (radio, sound art, audio books, and games, for example), time may be re-appropriated. We are experiencing what Schafer called a *schizophonic* shift in perception, where, by means of mediated listening we exist between two time zones, one created by our imagination and the other by the world around us. Devices, such as stereo headphones, mobile phones and portable games, which we use to pull us out of time, also act as filters: they give us the choice to decide what it is we hear and do not hear. Equally, we can choose to hear both spaces, real and mediated, so that we do not become so distracted in our mediated listening that we walk under a car. The increased use of mediated listening devices, particularly in public spaces, might be seen as an adaptation to the increase in sound levels within urban spaces. It could also be as a result of the sheer diversity of sounds that exist within our world, most of which have no meaning or relevance in our day to day lives.

There are massive assumptions being posited by researchers into the field of noise or increased sound levels. Schafer and the World Forum for Acoustic Ecology argue that increased sound levels are creating a rift between the natural world and humanity's relationship to it. They support research which is concerned with the "preservation of natural and traditional soundscapes" (Epstein, 2009). This focus on the conservation of older or traditional soundscapes ignores the "everyday urban situations impregnated with blurred and hazy...sound environments" (Augoyard & Torgue, 2006, p. 6).

NOISE: THE SIDE EFFECT OF INDUSTRY

The term *noise* is often used to describe unwanted sound or sound that, in its make-up, carries certain characteristics that define it as negative. Schafer's early work on the soundscape explored ways of quantifying noise levels. One of his early explorations into the soundscape used a system of tables which measured the amount of complaints made against certain noise sources and this project was carried out in several countries. Schafer's research concurred with what most people would suspect: in most modern cities, traffic is seen as a pollutant both for carbon emissions as well as sound levels. Yet in Johannesburg, South Africa, we see a very different picture in relation to what is seen as noise and what is accepted as city sounds (Schafer, 1977, p.187). The vast majority of complaints for sounds considered intrusive or annoying were made against the increased sounds of animals and birds within the city: unusually, the smallest numbers of complaints were directed towards traffic. It could be argued that one type of sound is seen as normal and part of the everyday urban while the more natural sounds no longer fit with the concept of an urban landscape.

Sound as Side Effect

One of the areas in which noise pollution has focused on within the urban soundscape is that of the motor vehicle, which is seen as a major contributor to increased sound levels within cities and towns. Bijsterveld's (2004) historical analysis of noise laws, highlight the increasingly negative public opinion directed towards the motor vehicle since the turn of the century. The city was increasingly seen as a space which had once held silence and that this silence needed to be regained, either through the removal of motor vehicles or severe noise laws. Yet, over the decades, a relationship has developed between motorists and the sounds of their vehicles, an idea which is being explored by Paul Jennings. Jennings' (2009) research focuses on the positive aspects of sounds produced by cars, from the sound of the door shutting, to the sounds of a petrol engine. He explores the various ways of simulating the sounds emitted by cars; studies have revealed that drivers have developed a relationship to the sounds produced by cars such as power, control, and drivability and so on. Simultaneously further research has shown that car sounds exterior to the vehicle are an important factor to visual orientation, particularly to the blind, hard of sight and cyclists ("Fake Engine Noises" 2008). The sound of a vehicle has become an inherent part of the urban soundscape and it is used to measure distance, speed, and time. In virtual terms, this association to a vehicle's individual soundscape has new meaning. If, for example, the hybrid car (electric and petrol and very quiet) becomes more prevalent in society, will we change the perceived soundscape of the urban space? For decades, we have associated the sounds of cities with vehicles and they have become a significant part of the urban soundscape, an ambience that defines the metropolis. If this sound disappears what effect might this have on our relationship to both the city and its transport?

Our Relationship to the Modern Soundscape

Industrialisation has had a major impact on civilisation, and the association of sound to production is seen as implicit. If we introduce noise abatement laws to tackle sound levels we ignore the relationship that has evolved between humans and the sounds of mechanisation and industrialisation. In our concern for the soundscape and its possible effects on humans we may change our soundscape to create a perceived better sound level or quality, but ultimately we might also change the relationship people now have to cities or industrial centres. It is necessary to fully understand the relationship that groups and individuals have to the urban soundscape, specifically the sounds that are reminders of its urbanity, economy, and population as well as its activities. MacLaran (2003) argues that the urban space is increasingly becoming partitioned and that the individual increasingly tries to locate a private space in which to claim ownership. With geographic boundaries becoming increasingly part of the urban space, defined by economics, politics and as a reaction to overpopulation, the urban space is increasingly seen as a "mirror of the societies that engender them" (MacLaran, 2003, p. 67).

Yet Thompson (1995) suggests that a changing landscape is part and parcel of the urban metropolis, people have and will adapt to further architectural or cultural shifts within urban areas, creating new cultures and social movements that stand alongside these changes to the landscape. What is not considered by these researchers is that a city is more than its visual or geographical cues.

Thompson argues that within the media, particularly the internet, new social structures will form within virtual spaces, and these will, to a certain extent, replace the physical world in developing community and place which is increasingly seen as crowded. Yet within mediated environments and the real world there is no real consideration to the soundscape and its importance as a social

construct in the formation of identity and society. There is a substratum of symbolic content associated with the visual space; Schafer's research has created a set of hermeneutics from which soundscape studies may draw. It is necessary to create dialectic on the soundscape, one which poses questions of meaning, noise, control, structure and interpretation. This becomes more significant as urban and governmental policy move towards controlling sound. If we operate on the basis that sound is a set of objects which can be assessed by their levels rather than their meaning, we will construct passive digital soundscapes.

While the study of sound through the social and physical sciences have advanced towards exploring sound as a subject, we are gradually moving towards an acoustic epistemology which embraces the ephemerality of sound. It is both sensorial and primary, a subject which needs fundamental and theoretical frameworks which can be realised through methodological research.

Unfortunately, in rushing towards categorising sound and its effects, certain policies have been created to simply categorize sound as noise, not understanding the many social contexts which may explain why, "despite successful implementation of noise maps and action plans…there is little evidence of preventing and reducing environmental noise" ("Working Group Noise Eurocities" n.d.). These policies fail to understand that sound has many social contexts and that this means understanding that sound is not simply a signifier of some otherness, an association with a producer; a product or side affect of technology, car sounds, factory sounds etc.

What this underlines is that there is a need to explore the control issue which has arisen within soundscape research, if sound is being seen as a negative effect of industry and modernism one which seems beyond the individuals control then we have a concept to explore in virtual soundscapes.

The positive act of listening in a virtual soundscape is that the sound can be controlled, be it through volume or interactive means of changing the sound environment. In the visual world of games certain elements are static and the controller cannot change or effect the environment. This is based on the conceptual approximation of reality, (a tree is a tree and must remain so in order to simulate reality). If we introduce ambient sound it too must approximate this idea a gamer can close their eyes to shut out the world, but no one can close their ears. But as in the real world we can create or find spaces of acoustic interest to us, we can in a virtual environment turn of an engine, perhaps a gamer should be able to turn off all engines and close down (*or destroy*) factories and other sounds they perceive as unwanted in their soundscape. Equally the soundscape should simulate reality, the ambient soundscape whatever that is must be all surrounding and there must be limits to the control of this sound that is if the intention to approximate the physicality of space.

I do not propose that we draw attention to the soundscape within games, the more real a soundscape seems, the less a gamer would notice it. Instead we must consider that to increase the perception of immersion the soundscape must reflect or approximate a real world soundscape, rather than being as a "bit part player to the visual star" (Grimshaw & Schott, 2007, p. 2).

Ambient sound denotes a sound that surrounds all physical space; it has been defined by some as foreground, middle ground and background sound (Adams, 2009; Schafer, 1977). This three part description of a soundscape lays out sound, within both the virtual and the real world, as an assemblage, one which is created as a result of reverberation, dynamics, levels and acoustics. These three characteristics imply that sound can be split apart to understand its workings, and then reconstructed as a virtual soundscape, that is if we ignore how sound is socially and psychologically perceived. While technology can break sound apart so that we can hear minute elements of the whole, we physically hear sound in its entirety because we cannot shut out sounds; we do not have what

Schafer called "earlids". We comprehend that sound may be reaching us from particular distances or places, and we make choices in regards to what we consider important sounds to listen to, but we cannot choose to not hear sounds within our hearing range. Equally we inhabit and work in spaces that produce sounds that we have to make meaning from and that we contribute to, our entire lives are spent surrounded by sounds. So how do we make meaning from these sounds and how do we measure that meaning? If we wish to simulate the experience of being within a space whether this space is a war zone a different planet or the North Pole, we must understand that sound is socially and culturally constructed (Drobnick, 2004). For sound design this is paramount, if we wish to create a simulacrum of the real we must understand to what extent sound plays in our navigation both physically and socially of spaces.

IMMERSION AND SIMULATED REALITY

It is the concept of immersion which guides design within the gaming industry, being seen as the "holy grail of digital game design" (Grimshaw, Lindley, & Nacke, 2008). Graphic design in gaming has evolved through several stages of realism, towards the appearance or "illusion of life" (Hodgkinson, 2009, p. 1). One outcome of this simulation of the real world within digital games can be seen in the film industry. Films are produced which have been based on games: *Tomb Raider* (West, 2001) and *Resident Evil* (Anderson, 2002). Equally we have movies which resemble gameworlds and the gameworld concept: *Final Fanta*sy (Sakaguchi, 2001), *Aeon Flux* (Kusama, 2005) and most recently *Avatar* (Cameron, 2009).

The focus of digital visual game design seems aimed towards an essential realism, but why this search for the most realistic? Early games were less concerned with the realism of the space or the characters and more on the idea of game and competition, for example *Space Invaders* (Taito, 1978), *Pac Man* (Namco, 1980) and *Donkey Kong* (Nintendo, 1981). Has the goal shifted towards the user having a more connected experience or relationship with the virtual or gameworld? If they space is a simulation of the real world do we engage less with the concept of a game and more towards the concept of being able to relate to the space. Bull and Back (2004) would argue that of the human senses "vision is the most 'distancing' one" (Bull & Back, 2004, p. 4), revealing only what is real and what is. The goal has evolved to create a sense of co-presence within film and potentially games; 3D cinema examines the possibility of the image creating a sense of surround and presence, again see *Avatar* and the new 3D TV from Panasonic. The overall assumption seems to be, that the only way to create a sense of reality within a digitally created world is through the imagery, a kind of simulated panoptic vision. What seems to be forgotten within this quest for immersion is that sound is actually three dimensional and listening is not a simulated experience.

Sonic Immersion

Sound is inherently physical and we are always immersed in it, even if we focus our listening towards one sonic experience we are still hearing the entire sonic effect of any space. This is then the challenge and the goal for digital game sound designers; to create spaces that accept the whole universality of the ambient space, and be aware of the outside world that will invariably intrude on this design. Therefore sound design must create a sense of displacement or removal from the real, while accepting that the real will equally intrude on the virtual experience.

Similarly digital game designers must address the issue of the senses being in their entirety necessary to comprehend a world. Surround sound must then play a part within the design of certain game spaces, for example, first-person shooter (FPS) games. FPS games generally involve a single

player navigating through a space; if they are to feel physically immersed the sound must seem all-surrounding. The need for surround sound or immersive experiences must also take into account the physics of sound. Connor (2004) argues that sound is both intensely corporeal, it physically moves us, and paradoxically immaterial, it cannot be grasped. He argues that sound does not simply surround us, it enters us, if loud enough or high enough it can cause pain and damage; it is seen as tied to emotion more so than sight which is seen as neutral. Within social theory sight has overwhelmed the senses; the epistemological status of sight over sound has crossed over to many disciplines including digital game design. In Simmel's 1886 work *Sociological Aesthetics* (as cited in Frisby, 2002), he argues that vision gave a fuller expression to the fragmented city, the eye if "adequately trained" perceives all of a space. This merging of all visual signals suggests that we do not see in parts but in total. Simmel saw sound as intrusive to the perfection of the visible world; it was the profusion of sounds that distracted one from the beauty of the modern urban space. Tonkiss (2004) argues that within modern sociology the goal was to flatten the city, to will sound to silence, to order it. Tonkiss suggests that vision is spectacle, whereas sound is atmosphere and she argues that sound offers us a sense of depth and perspective.

SOUND METHODOLOGY AND ANALYSIS

In order to identify what is significant about a soundscape one must adopt a multi- method approach. One method is soundwalking created by Hildegard Westerkamp and Murray Schafer in the 1970s. Westerkamp's use of this method involved asking participants to move through an area that was known to them and recording places of significance. These recordings would later become part of radio art works or installations.

The soundwalk technique has been adopted by different researchers for numerous projects around the world since the seventies. Most recently Adams adopted the soundwalking method for the *Positive Soundscapes Project* in 2006. The purpose of the research was to develop a holistic approach to studying the soundscape. The project invited people to engage in listening to their soundscape and then identify sounds of importance. Adams adopted Schafer's terminology of *keynote sounds*, *soundmarks* and *sound signals* as analytical models in which to assess the data. This method in itself does not clarify contextual or social meaning so we must explore other qualitative approaches such as field research and interviews, and deciding which qualitative paradigm will best suit this investigation.

Traditional sociological methods should play a part in the exploration of meaning and construction of sound. In Adams research, when "prompted to consider spatial layout" (2009, p. 7) the respondents tried to identify the sounds that they heard in the same way they would objects. This proved problematic as the participants had no vocabulary to describe the soundscape or its meaning. Simply focusing on identifying sounds and their meaning may limit the explanation or interpretation of cultural or social meaning. Therefore other methods must be incorporated into the exploration of the soundscape that enable the researcher to comprehend the ubiquity of the sound environment. Interviews both structured and open ended allow for the retrieval of information beyond the specifics of description. Adopting a soundwalking method alongside personal narrative interviews or life history interviews can connect meaning to hearing.

Allowing a participant a longer time to consider their sound environment, such as having them notate or record over a period of time, may reveal anamnesis experiences. This is where a sound can evoke a memory or sensation of a past experience. This is not as subjective as it may seem, the sound track in films—particularly the leitmotif—are

often used to refer to a previous part of the film causing a kind of anamnesis in the listener (Augoyard & Torgue, 2006; Chion, Gorbman, & Murch, 1994). Sounds become tied to experiences and therefore have a meaning beyond a description of sound and effect. Our participant, in having a longer time to record or document these kinds of experiences will allow for a further insight into what certain sounds can trigger.

Riessman (1993) argues that in the act of telling there is an inevitable gap between the experience and the telling: the sound methods allow for the participant to embody themselves in the narrated space, as they are situated in the environment to which they are referring to. What these combined methods may reveal lie not in how we listen to sound but what we hear when we actively think about listening. That in itself may highlight how much active listening happens in a person's life and if it turns out that there is, quite a lot heard in an individual's day to day experiences we must consider sound more actively in the design of digital soundscapes conversely, if we reveal that sound plays only a minor part in a person's relationship to his environment we may have to re-think how sound, beyond music, should be part of a digital game space.

Sequeira, Specht, Hamalainen, and Hugdahl's (2008) research on the hearing impaired noted that clarity is essential in picking up the minutiae within the complexity of sounds, as issues can occur when ambient sound levels are too high. The comprehension of language becomes more difficult when we try to distinguish dialogue which is surrounded by high levels of background sounds. Equally, Sanchez and Lumbreras's (1999) research in the design of digital gameworlds for the blind highlighted the need for 3D audio interfaces as a method in which to navigate space. They argue that users, when deprived of the sense of sight, are able to recognise spatiality and "localise specific points in 3D space, concluding that navigating space through sound can be a precise task for blind people" (1999, p. 1).

For digital game sound this does not necessarily seem an important issue, the ambient soundscape rarely includes high levels of conversational sound and game designers rarely design for the blind. Yet in cities and urban centers, vocal sounds and directional sounds are one of the dominating sound and spatial characteristics of the environment. There is interplay between vocal sounds and architecture; they will resonate at different frequencies depending on the construction of the space. Thus understanding how people distinguish sounds, such as vocals amongst a variety of other sounds may be relevant if a designer wishes to include this soundtrack of reality into sound design for gaming. Equally we can make choices in what direction we choose to go to based on acoustic as well as visual information. This could be explored through a series of listening projects whereby a focus group must listen to different sets of sounds while trying to engage in other activities. If the level of information and not volume is increased over time, one could ascertain how much information we can process simultaneously while trying to complete tasks.

Contextualizing Game Space

Understanding that there are a variety of ways to experience the gameworld is a necessary condition to deciding what soundscape should or could be placed within this virtual space. What is the operant behaviour of the gamer, what is the participation level and how much control in the gameworld does the player have? Finally how does one contextualise oneself within the world? Grimshaw and Schott (2007) noted that there was a feedback "for operant behaviours (panting breaths is a good indicator of the player's energy level) (2007, p. 475). In examining FPS games, we see that sound is predominantly responsive and reactive, rather than passively situated in the background, and this is a key component to this type of gaming. We may hear the dying groans of another wounded warrior in FPS games, but we

do not hear the voices of hundreds of men dying or in pain, a sound that would exist in a real war. Our experiences of explosions are controlled lest we be deafened, but where is the artillery constantly humming over the horizon, the perpetual whump, whump of helicopters marking or spotting territory? Jørgensen (2008) argues that symbolic sounds are key components in Player V Player games, more so than background. For her, game context is key: what kind of game is it and what type of space does the avatar inhabit? Jorgensen's research focuses on the *situation oriented approach* which interprets sounds in reference to events, rather than object orientated perspective. She argues that the gamer must understand the rules of the system in order to both manipulate it and understand that it "can affect individual actions" (Jørgensen, 2008, p. 2). This concept reflects Blumer's (1986) symbolic interactionist approach, where humans "define each other's actions instead of merely reacting to each other's actions" (p. 79). The other person in this case is the gameworld.

There may be several schools of thought on sound within gaming. If the sound is too real, would it terrify the gamer, distract them, annoy them, or just confuse them? Both Schafer and Smith have looked at the history of the soundscape and analysed the possible cause and effect of certain soundscapes on the human condition (Schafer, 1977; Smith, 1999, 2004). However, a new research model is needed to identify how certain sounds trigger emotive or psychological responses, particularly to the soundscape that is featured in a large number of games: war sounds.

For a conclusive multi-method we must first decide what is actually needed in a digital game space. For example, if the game has no point of free space where the player can actively listen to their environment, is it necessary for a detailed soundscape? This question may be answered by the questionnaire approach; a series of semi structured interviews may reveal how people hear a space that they only traverse through. This type of interview allows the interviewer a certain level of control which directs the interviewee down particular paths. Equally it allows the interviewee to expand on themes outside the limits of the question, which can reveal unexpected information (Bryman, 2008).

The Mapped Soundscape

If we were to map the soundscape of a city where would we start? Would we first categorize it, a heading from loudest to quietest or might we break it up into specific human sounds, crowds, individuals, groups of five or more, age related or gender specific? Females have a different tonality to their voices compared to men, children have higher pitched voices to adults, and teenagers are louder than everybody. Then we refer to acoustics, how different do people sound on a pedestrian street as compared to a car filled street or even a park? We can then examine the architecture of the space, the height of the buildings their position and how this might change the reverberant space.

Then we could move on to city noises, for example trams running through a city. This would sound at a very low but continuous level, marking specific territories within a city at particular times. Then there is the multitude of cars, trucks and vans and the occasional house alarm, fire alarms, fire trucks, police cars and ambulances sounding off regularly throughout the day, reminding us of sickness, danger and intrusion. The continuous hum of traffic that never quite stops, but it shifts in decibel level throughout the day and sits alongside a cacophony of beeping horns. There is the opening and shutting of thousands of doors onto streets, which might include the hiss of sliding doors, the beeping signals at pedestrian traffic lights, or a robotic voice counting down till we can cross the street. These sounds are part of the ambient soundscape of most cities, but they are still just a small part of the overall sound.

Maybe we think we have not heard the sound of a million footsteps pounding a street—it is such a

huge part of the murmur of a city that we no longer distinguish it from the background noise—yet if it stopped… we would notice the silence. The street hawkers and homeless, a perpetual cry of, "What do you want?", "Can you give?", "Have you got any change?", "Will you buy?", Specific sound markers in Dublin are, "flowers get your flowers, get your fruit, get your veg, paper, eve-nin' paper, any money for a hostel". These oral announcements could also be considered part of the ambient sound track of the city. They would in fact be the soundmarkers for particular urban spaces. This multitude of sound still leaves out the sounds related to the outside or inside acoustics created by structures and objects such as build-ings, cars, trains or metro stations.

If one moves to what urban dwellers consider the *apparently* quiet soundscape of the natural world, we find a multitude of sounds connected to the society of animals, from mating cries to hunting calls as well as the sound of eating and foraging, flying, climbing and running. There is the ambient sound of wind through trees, grass or wood bending, rain storms, flowing rivers, rippling water, small streams, and all of this situated in one small area. Now relate this minimal soundscape to sounds within gaming. Such a comparison might lead us to ask how we can experience a real, or significantly close to real, soundscape in a virtual world if the sound design is limited to "character or interface sounds" (Grimshaw & Schott, 2007).

This description might be considered too linear and too connected to time and human activities. The ability to comprehend space and the sounds within it are not based entirely on the ability to hear, it is also based on the cultural and social context of both the sounds we hear and our in-terpretation of them. Blesser and Salter (2009) would argue that we cannot interpret and construct sonic architecture without accepting the cultural relativism of the sensory experience.

Therefore in my description of the urban rural soundscape I cannot claim to be objective; my choice of sounds relate to my experience of par-ticular spaces, my interpretation of these sounds lie in my education, upbringing, and the socially constructed meanings that are inevitably tied to certain sounds.

We again return to what Augoyard and Torgue (2006) would consider the inherent problem of describing or analysing a soundscape: the subjec-tivity issue. If each group or individual perceives sounds differently, how can we generalise when constructing a soundscape? This argument could cross over to many disciplines, within the arts it is generally understood that a work of art is best understood by the artist who made it. Yet the artist accepts that their work will be interpreted differently by every person that sees it. So what makes a great work of art? Is it tied to cultural phenomena, can a particular work be representa-tive of a particular time? Do people understand the meaning because it resonates with what is happening at a particular moment, globally, politi-cally and socially?

It is not enough to dismiss understanding how the individual experiences sound because it is sub-jective, we must explore how people understand sound in particular places at particular times and then look for similarities between other places and people. Then perhaps we can generalise in the construction of digital sound design based on data that reveals particular generalities.

CONCLUSION

The interpretation and meaning of sound alters in relation to personal, historical and cultural experiences, as well as the context of our auditory experience. The physicality of sound can alter our perception of the space in which we hear it, expanding or contracting the landscape and shap-ing our psychological and sociological response to place. If we wish to construct a digital soundscape which simulates reality and creates the sense of immersion, a study of the sociological impact of the soundscape must be undertaken. However the

consideration of what defines reality and experience must also be explored. As mentioned earlier in the text the simulated soundscape of war games are not based on the real soundscape of a war zone, but on a sound designer's definition of war sounds. What definition of reality are we measuring this soundscape of virtual worlds against, and how real do we want our virtual environments to be? Most of the environments we experience within games are spaces which we may never experience in reality. Our experience of certain soundscapes may be understood in relation to other media representations: television, Internet and cinema. The digital game soundscape then becomes a construct of definitions rather than a simulated reality.

If we are trying to simulate a sense of reality in gaming we must consider how real we wish to go. Grimshaw (2007) argues that it is only through the audification of gaming that we actually simulate the idea of immersion. This implies that sound in itself provides a sense of reality whether or not the sound is based on reality. So what is it about the physical aspects of sound that create a sense of being elsewhere? It is not enough to suggest that because sound is physical it creates a sense of immersion. Sound must be understood beyond the physical, a language must be developed as a result of empirical research which explores the sociological phenomena of sound.

Thibaud (1998) suggests that we must create a "praxiology" of sound from the natural soundscape before we construct artificial soundscapes. He also argues that beyond just meaning and interpretation, sound can and does affect our choices; we pick up "information displayed by the environment in order to control actions (such as locomotion or manipulation) […] thus, the environmental properties and the actor/perceiver activities cannot be disassociated: they shape each other" (Thibaud, 1998, p. 2).

Sound can be both active and passive and this will affect our response to it. Driving a car, for example, might be considered a passive produc-

tion of sound, we have no choice in the sound the engine makes, but beeping a horn is active sound making. Thus sound production has an implicit message the interpretation of which might be subjective. Whether it is perceived as positive or negative can depend on the intention. It may also affect behaviour, do we choose to move out of the way of a vehicle or allow it to stimulate anger or other emotive responses.

This active sound does not simply reference the acoustics of space or a description of noise; it carries a message, a description of a situation that has social and cultural context. If, as Thibaud (1984) suggests sound is not a "mere epiphenomenon or secondary consequence of activity" (p. 4) then we must consider that all sound has meaning, it is how to deconstruct that meaning that will allow for a clearer understanding of the soundscape. With this understanding we can construct digital soundscapes which will challenge the perception that the image is what gives the illusion of the real.

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KEY TERMS AND DEFINITIONS

Holistic: In order to understand the whole of a system, one must look at the parts within it that make it up. Within sociology, Durkheim developed a concept of holism which is in opposition to methodological individualism.

Immersion: To be completely surrounded by sound.

Mediatization: Sonia Livingstone's definition of Mediatization is for me the most accurate because it refers "to the meta process by which every day practices and social relations are increasingly shaped by mediating technologies and media organisations" (http://www.icahdq.org/conferences/presaddress.asp par. 3).

Schizophonic: Murray Schafer describes the term schizophonic as the split between an original sound and an electroacoustic reproduction in a soundscape. I am using it as a metaphor for a split between two types of listening spaces: If one is listening to music while traversing through a real space the attention is split in comprehension between the real world space and the virtual soundscape.

Social construction of space: Social constructivists examine ways in which individuals and groups participate in the creation of their perceived social reality. In this context, I am focusing on how society can change their perceived space through sound, either by how they listen to or produce sound in a space.

Sonic Architecture: The study of the acoustic affect of objects such as building's, interior and exterior, on space. Equally, sonic architecture explores how people can construct sonic structures or challenge the sounds of places by creating their own sonic space.

Soundscape: Refers to both natural and man-made sounds that immerse an environment.

Soundwalking: A soundwalk is a journey where the objective is to discover an environment by listening to it.

Symbolic Interactionist: The study of micro-scale social interaction. It is seen as a process that informs and forms human conduct, the premise being that humans beings act on and upon things based on the meaning these things have, things being defined as physical objects such as chairs, trees, phones, and human beings, mothers, shop clerks and so forth.