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An autoethnographical study on how
creative sound work is affected by
commercialisation and the professional
media industry

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A thesis submitted to the University of Huddersfield in
partial fulfilment of the requirements for the degree of
MA by Research

The University of Huddersfield

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Abstract

This project sought to investigate how creative sound design is mediated by its place within a professional, commercial context using socioculturally framed qualitative inquiry from an autoethnographical perspective. As a freelance sound designer I wanted to find out how a commercial setting influenced the creation of my work.

Multi-modal autoethnographical case studies and qualitative data collection have been used to better understand if there are factors influencing the outcome of the work. This thesis places an emphasis on the study of creativity in professional practice and its implications.

Data was collected in the form of screen capture, verbal protocol and email correspondence for each project. I have also provided a chapter for personal autoethnographical reflection that provides a phenomenological as well as an analytical retrospective approach.

It was found that there were five main factors that mediated my creative process. These were:

1. Time
2. Correspondence
3. Physical environment
4. Technology
5. Budget

The various ways in which time influenced process constituted a major factor in the mediation of creative process, shown through a multimodal approach using rich data capture across two game sound design projects.

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1. Introduction

1.1. General introduction

This thesis addresses the subject of commercialisation and how creative work within this context affects process regarding computer game sound design. The research attempts to bridge the gap regarding the socioculturally framed study of creative process focusing on creativity in a professional and commercial context. Current studies of this nature have been used to highlight how social and cultural factors shape music composition process in an education and research setting (Folkestad et al, 1998; Collins, 2005; Berkely, 2004; Burnard et al, 2002; Eaglestone et al, 2001; Kirkman, 2010). In this study I draw on theories and methodologies presented by this field research and apply it to the study of process in professional game sound design.

1.2. Personal background

This research attempts to answer the questions I asked myself after completing my undergraduate degree and during my transition into designing sound effects for the commercial computer game industry. I am a freelance (Clindon et al, 2006) professional sound designer and composer and had previously only written music for pleasure. This research aims to help me understand how my creative process has been affected by this commercial context and if I can use the knowledge to improve my creative practice.

1.3. Theoretical background

This thesis adopts a pluralist view of creativities (Burnard, 2012) that is aligned with the second and third wave of research into creativity (Sawyer, 2014). This line of research is guided by a sociological view that human activity is mediated by tools (Vygotsky, 1978),

placing an emphasis on the study of interaction and process through interrelationships with social and cultural tools and surroundings.

1.4. Research question

This research asks the main question:

1. How is my game sound design process mediated by its commercial context?

This question is explored through a series of personal case studies (Bitektine, 2008) to determine if there are any main mediating factors, as well as uncovering any other related findings regarding my sound design process.

1.5. Methodology

The methodology presents a longitudinal autoethnographical (Wall, 2006; Kara, 2013) case study that focuses on the real time capture of creative process in order to uncover social and cultural factors that mediate my process. Based on Folkestad et al (1998) and Collins' (2005) methods of studying process, I was able to devise my own methodology that used multimodal rich data capture, alongside reflective, personal analysis.

1.6. Data collection

Data was collected in the form of computer screen video capture, verbal protocol (Collins, 2005) and email correspondence between myself and clients.

1.7. Data analysis

Screen capture data was analysed using QSR NVivo by coding my engagement in salient activities during the sound design process, as well as identifying key words in the verbal protocol specifically relating to the passage of time. Correspondence was analysed using a

form of textual analysis (McKee, 2003) to identify shared cultural meaning within feedback emails.

1.8. Creative portfolio submission introduction

As part of the requirement for this degree I have included a commercial portfolio of sound design works relating to the main body of research into process. The materials are a direct result of the self-observation conducted for the research and form a 30 minute portfolio of works stored on the USB stick provided with the submission.

1.9. Creative portfolio submission contents

Gameplay footage

- 10 minute gameplay footage of Warhammer 40,000: Freeblade.
- 10 minute gameplay footage of Magic Duels: Origins.

Sound design example videos

- 5 minute selection of sound effects from Warhammer 40,000: Freeblade.
- 5 minute selection of sound effects from Magic Duels: Origins, with development animations.

Folder containing full list of sound design .wav files for each game

- 346 sound effects for Warhammer 40,000: Freeblade.
- 48 sound effects for Magic Duels: Origins.

As this submission consists purely of sound design for game, I encourage you to download and play the games as they are best suited to this medium. Warhammer 40,000: Freeblade is available on iOS and Android and can be downloaded using this QR code:



Similarly, Magic Duels: Origins can be played on iOS, PC (Steam) and Xbox One and can be downloaded using this QR code:



2. Literature review

2.1. Autoethnography

This research presents an autoethnographical study of my personal creative work processes and therefore relies on personal reflection as a part of the research (Forber-Pratt, 2015).

The voice of the researcher is rarely heard within academic literature, favouring a passive voice to present in a more objective, scientific manner (Wall, 2006). The affordance of an autoethnographical approach is that it provides the self-researcher a platform with which to express their experiences and feelings alongside the research.

2.2. Creativity

2.2.1 The study of creativity and sociocultural theory

According to Sawyer (2014), the study of creativity in the twentieth century has been observed in three 'waves' of different research areas. The first wave is called the 'individualist approach' which studies the personalities of 'exceptional creators', or the 'genius' view of creativity (Osborn, 1953; Guilford, 1950). The second wave of creativity research is referred to as a 'cognitive approach' that focuses primarily on the thought processes of those engaged in creative activity. The third wave is the 'sociocultural approach' that focuses on social and cultural context including social systems and how people interact with each other (Sawyer, 2014).

The merging or 'interdisciplinary approach' of this second and third wave of creativity research is relevant as the main purpose of this thesis is closely linked to the study of process within a sociocultural context. Sociocultural theory is a term used in social sciences to show understanding of personal circumstance and social context within relevant research (Vygotsky, 1978). Vygotsky theorised that cognitive development is mediated by our

interaction with cultural and psychological tools, such as language. His work introduced an emphasis on process with regards to understanding child development. He observed naturally occurring events and how they were mediated by social and cultural tools, concluding that a child develops first on the social level before the individual level through their interrelationships with these tools, using them to develop cognitively as well as shape the tools around them. Later scholars argued that such sociocultural tools can also be physical and concrete, for example a musical instrument, or a computer (Wertsch, 1988). In order to understand creative process as observed through a sociocultural perspective, it is necessary to look at how earlier models of the creative process developed as a foundation to the study of process through this lens.

2.2.2. Modelling the creative process

Creativity as a cognitive process has been modelled in various ways in order to understand what might be happening when someone is engaged in a creative activity. Wallas (1926) developed the first model for mapping creative process that identified four key stages: preparation, incubation, illumination and revision:

Identify need/deficiency, random exploration and pinning down the problem.
Preparation by reading, discussing and formulating many solutions, critically analysing the solutions for their advantages. Then there is the birth of the new idea – insight, illumination. Experimentation to evaluate the most promising solution for eventual selection or perfection of ideal. (Wallas, 1926)

This model of understanding creative process is applicable to any creative practice and also introduces the notion of a link between creativity and problem solving that is not discussed

by some later researchers (Bransford, 1979, Gilhooly, 1982, Martindale, 1981). This process model has been built on by later researchers as a basis for other models and was later coined the 'Wallas Process' (Osborn, 1948; Patrick, 1955; Parnes 1962; de Bono, 1967).

2.2.3. Creativity as a form of problem solving

The link between creativity and problem solving exists as part of the second wave of the study of creativity (Sawyer, 2014) which also lends to the notion of process being mediated by surroundings. Assuming the mind is shaped by social, cultural and physical factors, the cognitive process of creativity will always be bound by such mediators. Weisberg (1988) highlighted the limitation of a person's dependence of past experience when engaged in creative problem solving. This research provides evidence that cultural norms and perceived function can be a hindrance to divergent, novel thought. De Bono (1970) developed the term 'lateral thinking' as a way of problem solving through creative thinking that intended to break habitual thought in order to solve problems in new ways when one could not be solved by conventional methods. This indirect approach to solving problems encourages a creative to use and adapt the sociocultural tools at their disposal.

Repetition and the reshaping of available sociocultural tools guiding creative process has been shown to improve a person's capacity for creative thinking. Alongside research into creative problem solving, Rideout (2014) examined if creativity could actually be increased. He conducted research into the notion that you could increase your creativity over time by means of routine and repetition by writing a portfolio of 170 of songs over the same amount of days. He found that routine song writing was key to producing a high quality output of material, where extended breaks from composing were liable to have a detrimental effect on creative confidence and thus, lower quality work output. In context

with problem solving and sociocultural factors, this constant repetition of creative tasks could mean that there is a learned method of lateral or non-habitual thinking that can be practiced. My personal study largely focuses on repeated tasks in creative work and how they are shaped by my interrelationship with my surroundings and technology. As well as repeated tasks becoming a factor in mediating the creative process, the physical and cultural environment in which creative work is conducted could play a crucial role too.

2.2.4. Environmental factors

Environmental factors are considered when studying creativity in what Hennessey & Amabile (1988) call 'the conditions of creativity': 'Love felt for one's craft can be quite delicate and easily overshadowed by pressures in the environment'. They described 'the intrinsic motivation principle of creativity' in which 'people will be most creative when they feel motivated primarily by the interest, enjoyment, satisfaction, and challenge of the work itself – not by external pressures' (Hennessey & Amabile, 1988, p11). This research is important as the words prioritised to describe the motivation principle are: interest, enjoyment, satisfaction and challenge. These key words are relevant to the notion of 'flow' as a state of mind when engaged in an activity in which the ability of an individual is equally matched by the challenge of the task, resulting in a feeling of 'total involvement' (Csikszentmihalyi, 1996). People experiencing this flow state are usually said to be completely engrossed in their task, almost oblivious to external surroundings. The conditions for the experience of flow can be mapped on a graph whereby if a person's skill level exceeds the difficulty of the activity by too much, it can become boring, or if the activity is too difficult for the skill level of the person, it can become too stressful to fully engage. The knowledge of flow and its conditions can be linked with the interrelationship

between the creative person and their surroundings, relying on an equilibrium between skill level and challenge to maintain this state.

As well as the social environment issues present in facilitating creativity and flow, a physical environment in which 'external evaluation is absent' is referred to as a condition for unhindered creativity (Rogers, 1954). This external evaluation of a creative individual can be regarded as a potential problem in the study of process, creating another mediator on top of other social and cultural factors (Wallace, 1985). Self-evaluation could have a similar effect on the mapping of creative process constituting an unavoidable environmental influence on my own practice. If environmental factors do indeed influence creative process, an addition to this factor would be if it were introduced to a commercial context.

2.2.5. Creativity in commerce

Simonton (1988) discussed what he calls *propositions* about the nature of creativity. The first proposition assumes that creativity is a form of leadership whereby *process, product, person* and *persuasion* or 'The Four Ps' affect what society deems to be creative, relying on personal persuasion to influence the public's view on an individual's creative product. His second proposition is that creativity 'involves the participation of chance processes both in the origination of new ideas and in the social acceptance of those ideas by others'. Both of these propositions are equally important in the study of creativity regarding creative products as a commodity as well as exploring it within a sociocultural context. Qualitative inquiry into creativity within organisations has shown that financial reward can often be detrimental to creative output (Amabile, 1988). Amabile et al. (1996) developed a specific method for analysing the 'climate for creativity' called *KEYS*: 'designed to assess perceived stimulants and obstacles to creativity in organizational work environment'. This helped to

distinguish the study of creativity in organisations as set aside from the study of the individual or arts. Factors that affect employee creativity have been explored within company environments where social interaction is key in completing multidisciplinary tasks. The issue of contextual influence on creative performance has been examined in professional settings showing how employee relationships and outside factors can affect creativity and outcome of work completed as a team. Choi et al (2007) highlight issues such as unsupportive environments, mistrust and aversive leadership as factors affecting the creativity of individual employees. This shows that within a workplace environment, mediating factors on creativity and work output have already been discovered. These mediators are not purely limited to the tools used and time given for a task, but are shaped by the nature of the workplace environment, social factors and how creativity interlinks with various teamwork tasks. (Choi et al, 2007; Parboteeah et al, 2007).

For the purpose of this autoethnographical study I am interested in how my own creative process is affected by social, cultural and environmental factors, and how these mediate my interrelationship with the tools around me. For example these mediators might be found on different levels, such as social discourse, the use of computer software and its limitations and affordances, time constraints, the time of day, physical work setting, and self-observation. All of these factors potentially play a role in affecting my overall creative process. The introduction of a commercial setting is a possible factor that has not as yet been explored through a sociocultural perspective. This emphasises the need to discuss the role of creativity within the commercial world and how creative work can be affected by commercialisation.

In order to understand process within a particular creative field such as sound design, it is important to build a pluralist (Burnard, 2012) view of the study of creativities that shows many relevant facets to the field with which to study. The second and third wave of research into creativity (Sawyer, 2014) necessitates the need to discuss creative process, leading on to discussion relating directly to musical composition. In my case, I am using established studies on composition to subsidise the fact that these are more numerous than those relating directly to the processes involved in sound design for computer games. The interdisciplinary sociocultural view of creativity constitutes the main theoretical grounding for my research into my own sound design endeavours with the observation of process taking centre stage for this thesis.

2.3. The sociocultural study of composition

2.3.1. Introduction

Sociocultural research into the analysis of music composition has been conducted alongside ongoing studies on creativity since the rise of computer-based music making. This is due to computers providing a means to collect rich data from a variety of sources whilst a composer is in progress. Numerous studies of this nature focus on student composers or children as they reveal information about the development of creativity and the mind in a pedagogical setting (Fokestad, 1996; Berkely, 2004; Collins, 2005; Kirkman, 2010). This line of inquiry is useful for finding out how student composers develop ideas and meaning between the tools and their surroundings; however, this study of ongoing skill development alongside the development of musical creativities can become problematic if in context with an autoethnographical study of professional work, assuming that a level of skill and knowledge has already been attained by previous similar activities or years of study.

2.3.2. Autoethnographical study of composition

The autoethnographical study of composition tends to be completed as a researcher's own way to rationalise decisions behind music composition provided for an academic setting, usually from a predefined research angle in the hope of finding unique and artistic results (Harvey, 2014; Rideout, 2014). The assumed knowledge of creativity in practice means that most theses about composition would naturally compose the work without any self-observation, allowing a setting free from external evaluation (Rogers, 1954). Whilst it is beneficial for any creative process to be conducted without evaluation, this is a necessary factor in a study such as my own where I am explicitly studying the creative process and outcomes.

Newman (2008) conducted a qualitative autoethnographical study on his own compositional works. The data he recorded constituted a direct reflection of his thought processes at the time. He raises questions regarding self-study as explained in his methodology outline 'Could I avoid performing a detailed post-compositional analysis on the text of my piece?' Instead of this post-compositional analysis he opts for a mixed method qualitative study framed by sociology and anthropology. When designing his methodology he pieces together many approaches based on his interest in the social sciences. This, along with other studies shows that there's no standard way of analysing the mind of a composer and that more experimental approaches are necessary, merging known methods of study that are not traditionally used for compositional analysis. This lack of a standardised method of studying composition process from such varying perspectives can be provide difficulties in finding useful methodologies dealing with process to build upon for future autoethnographical studies regarding creative practice.

2.3.3. Constraints regarding a qualitative anthropological approach

There are known pitfalls and constraints to this qualitative anthropological approach specifically regarding electroacoustic music composition (Eaglestone et al, 2001).

Electroacoustic music incorporates aspects of sound design, software development and experimental composing techniques, which is invaluable to my own methodology design as it can be related to the creative component of the practical work presented in this thesis. Eaglestone et al first focuses on the use of computer software and the fact that the design of the software will somehow influence the creative process, rather than merely a tool with which to write conventional note-based music. They agree that other studies such as Folkestad's (1998) studies of composition were important examples of study from an educational perspective with information taken 'after the event'; however, a different approach was needed for a field such as electroacoustic music. The reason for this lies in the genre's differing emphasis on the use of note-based music, instead relying on computers and software as the main 'instruments' with which to finalise a piece of music. It is important to note that Eaglestone's article highlights the use of software in music making: 'In general, it is clearly inappropriate for composition software to constrain composers by imposing "best practice" or characteristic working methods and procedures.' (Eaglestone et al, 2001). This shows that the software is not only the way work can be completed but as an extension of the creative process behind it, incorporating software design as part of the music. 'Best practice' refers to a standard DAW¹ layout and default features, for example starting any project at a tempo of 120 beats per minute, potentially influencing the outcome of the music before it is even started. As my work is conducted mainly using a DAW these

¹ Digital Audio Workstation

realisations about software mediating process can now be taken into account as part of my own study of technologically mediated creative practice.

The relevance of sociocultural studies on the development of electroacoustic music is that the genre incorporates elements of sound design that is used as part of the music. I have chosen this approach in lieu of studies of this nature being carried out for the observation of creative process involved in computer game sound design. The purpose of this is to solidify the need to frame this field of study within the context of sociocultural theory. Despite electroacoustic music using aspects of sound design, the largely commercial context of game sound relies heavily on its co-evolution with computer technology, necessitating a strong knowledge of current technology's limitations and affordances.

2.4. Game sound

2.4.1. The evolution of technologically mediated game sound design

Sound design for computer games has always been bound by certain restraints such as technology, software development and budgets (Grimshaw, 2010). Early computer games were heavily restrained by the power of computer technology at this time. Storage and computational limitations meant that sounds and music had to be synthesised by the computer processor rather than being able to use previously recorded media. These limitations meant that sound designers had to develop new ideas of how sound could be portrayed in these games. This 8-bit synthesised sound world synonymous with computer games from the 1970s and 1980s became part of modern pop culture surrounding video games such as *Super Mario Bros* (1985). This example of a perceived limitation transcending the bounds of technology shows that technological limitations can become part of a cultural identity. The growing popularity of lower budget independent games has helped solidify this

relevance of 8-bit music and sound today as a way of setting them apart from higher budget studios using the latest graphics and sound technologies.

Game audio has classically been present to accompany the visuals of a game, however, there has been numerous experimental, audio based games available dating back to 1974. A game called *Touch Me* by Atari offered both a visual component as well as audio, but could still be played by the visually impaired. Games such as *Audiosurf* (2008) can be completely reliant on input from an audio source to generate the 'level' that a user will play on. In *Audiosurf's* case it requires access to a player's stored music library to create racetracks and collectable points based on the shape and rhythm of the sound file's waveform. Other examples include *FRACT OSC* (2014) which adopts a first person play style with puzzles based on synthesised music to progress further with the game. These sound based computer games show that for some, sound is considered in the production of the game above other elements. This considered prioritisation of sound design effectively creates a higher expectation of the game to be somehow unique and ground breaking than its visually led counterparts. This implied cultural pressure to deliver new creative ideas could ultimately affect the process and outcome in the attempt to reach a novel result. Modern computing has all but removed these previous limitations in the implementation of game sound in part due to hard drive storage space getting larger and better computer processing power to manipulate recorded sounds in real-time. This affords more creative considerations in making sound effects as there is now fewer limitations on file size and fewer constraints on the tools used to create and edit the sounds.

2.4.2. Game sound design budgets

As an inherently commercial entity, computer games are invariably influenced by the introduction of financial reward. Researchers have highlighted the negative impacts of conducting a creative task with financial reward as a main outcome (Amabile, 1996) although creativity is no doubt an important aspect of a professional work place (Choi et al, 2007). Grimshaw (2010) states his frustration that 'sound is about 50% of the experience (but not 50% of the budget)'. Audio, in general, often seems to be overlooked within game budgets despite its important role. For lower budget games that outsource sound design for lack of in-house audio specialists, sounds are usually not implemented until the game is at a playable state, far into the production cycle. The implication of this is that the preplanning phase can be almost non-existent, forcing the sound designer to become reliant on pre-recorded sound libraries rather than mostly bespoke recorded sounds completed in-house. My research focuses on the latter situation given that I am a freelance sound designer working on behalf of a production company that primarily works to such time-sensitive deadlines.

2.4.3. Aesthetic limitations in process and implementation

The typical process of creating sounds for computer games is standardised depending on the types of sound being created. This standardisation could possibly act as a constraint within the creative process as sounds in computer games need to be created with interactivity heavily considered (Collins, 2008). In contrast to editing sound on a continuous timeline for fixed mediums such as film, interactive sound design can present certain aesthetic challenges such as if the game is very busy or fast paced, there is a possibility of too many different or similar sounds being played simultaneously, resulting in an unpleasant experience for the player. Due to such factors, extensive preplanning is required as well as

troubleshooting any errors that do occur during production of the game. Because of this rigorous planning process it is possible that some creative ideas could be omitted in favour of adhering to time or financial constraints. Other aesthetic limitations can occur in some circumstances such as the rapid repetition of a certain sound such as gunfire. Whilst it is possible to design implementation systems that vary the tone of sound files to seem less repetitive, the constraint of time or money can present scenarios where this solution is not possible, leaving such problems unfixed. All of these possible technological and commercial factors unique to computer game sound are an important contrast to the studies relating to music composition. For this reason it is beneficial to begin research into sound design in a similar way to build up a better picture of how this context affects process.

2.4.4. Sociocultural issues with game sound design process

The study of creativity and process using a sociocultural perspective provides a theoretical model with which to base my own autoethnographical research into process regarding game sound design. The main points for discussion for this topic lie in the fact that the practice is intrinsically commercially motivated and relies on the use of current technology to remain successful (Collins, 2008). This interdisciplinary and pluralist approach (Sawyer, 2014; Burnard, 2012) to creativities and the study of process (Vygotsky, 1978) show that there are many issues surrounding any creative process where the surrounding environment could mediate a person's interrelationship with their craft. The salient issues surrounding cultural mediators and their influence on the process of game sound design are:

- Time deadlines
- Technology and software
- Social discourse
- Budget and commercial context
- Physical environment

These key factors form the basis of my main research question as presented in the methodology.

3. Methodology

3.1. Introduction

This research is framed by sociocultural theory, which prioritises the notion that process is mediated by psychological and physical tools (Vygotsky, 1978). This theoretical foundation enables my analysis to focus on the interrelationship between myself and my situation of work with attention to time, technology, correspondence, environment and commercial context. This research is therefore a longitudinal case study that explores aspects of the real-time capture of my sound design work. The analysis seeks to establish which social and cultural factors mediate process, which required me to collect data in the form of video screen capture, verbal protocol and email correspondence resulting in a rich, moment-by-moment dataset.

3.2. Research questions

The main aim of this research is to answer the question:

1. How is my game sound design process mediated by its commercial context?

This can then be broken down into two sub-questions to gain deeper understanding of process:

1. What is the main factor in shaping my sound design process?
2. What can I learn from my own creative practice having conducted this research?

3.3. Methodological issues

3.3.1. The study of process

A phenomenological insight into the decisions behind any creative work such as composition has to draw on direct correspondence with the original composer or observation whilst the work is in progress. Prior to a series of interviews with eight composers (Bennett, 1976) most studies of musical composition were conducted by analysing the written composition itself without contact with the composer in question. Bennett found that gaining an insight into a composer's method directly could outline their creative process based on the previously mentioned '4 stage' model of creative thinking (Wallas, 1926). This and many other studies on the subject of creativity has led to a deeper understanding of how a composer works, linking the individual's creative process to a form of problem solving (Berkley, 2004).

Authors of more recent studies (Folkestad et al, 1998; Collins, 2005; Eaglestone et al, 2001) are similar to my own in the sense that they have devised their own particular qualitative methods to analyse data collected from the individuals that they studied. For example David Collins (2005) used a number of data collection methods such as MIDI save-as files (Folkestad et al, 1998), audio files, and interviews with the composers. This built a picture of the process that the composers experienced to achieve a final piece of work in a segmented and linear, as well as retrospective analysis of the cognitive process. These methods are

beneficial for identifying prevalent changes in the work as the composer developed the piece but small details may have been lost along the way without a direct observer. Collins (2007) expanded these methods by introducing verbal protocol, which is a way that real-time thought processes can be captured, showing an insight into problem solving decisions the composers were making at the exact time they were making them. Combining this data maps the composition process but does not show exactly how the compositional tools mediated the creative process.

A temporal analysis can offer valuable insights into creative process, for example, the collection of 'MIDI save-as' files from different stages in the creative process proved useful in capturing the emergence of ideas at a time where computer storage solutions remained too small for larger data capture such as digital video (Folkestad et al, 1998). This method remains a valid form of real-time tracking of the composer's ideas as most computer programs still use the save-as function. From the save-as data captured, Folkestad was able to analyse and define six discrete compositional strategies. These were split into two main categories: horizontal and vertical, with each of these split into three sections. Horizontal composition focused on completing the form and content of the composition as the basic overall structure before using the computer and other instruments to expand on the arrangement and instrumentation. Vertical composition takes a different approach and prioritises full instrumentation and arrangement of each clear section before moving onto the next, creating vertical 'chunks' of composition that could be copied and moved as appropriate. These findings show how temporal analysis necessitates an element of intervention by the subject can yield a rich qualitative insight into composition strategy.

The key issue with capturing real time data as an external observer is that without feedback from the composer as they are working, it becomes difficult to uncover information about creative process after the fact. Collins (2005, 2007) handles this by prioritising ‘verbal protocol’ as a data source to gain a real-time insight into composers’ thought processes, revealing links between composition and creative problem solving. The term ‘verbal protocol’ is used by researchers such as Nuhn et al (2002), and Collins (2005, 2007) when a composer is verbalising their own thought processes as they are engaged in work. This provides the researcher with a way of capturing real-time data during composition. Collins (2005, 2007) used verbal protocol in conjunction with MIDI save-as files, screenshots and text (transcribed interviews) to map three main components of the music composition process: real-time mapping, thematic mapping and structural mapping. The merging of these techniques allowed a more complete model of compositional process using the sociocultural perspective.

3.3.2. Analysing collaborative creativities

Observation of process can reveal how collaborator interactions shape individual process. Dobson and Littleton (2015) focused on the analysis of emergence of co-creative music composition in a music technology setting. They explored the collaboration between two composers in a naturalistic setting as well as how the work was mediated through its interrelationships within its social, cultural and physical settings with the composition tools at their disposal. Whilst my own creative process detailed in this work is largely undertaken on an individual level, my research presents asynchronous interactions over email with the managers at PitStop Productions. This form of collaboration has not yet been investigated in this way.

3.3.3. Autoethnographical approach

Many studies on composition process have been conducted by researchers observing subjects other than themselves (Folkestad et al, 1998; Collins, 2005; Eaglestone et al, 2001; Dobson and Littleton, 2015); however, these qualitative studies observe few participants and while there is a rich resource of multimodal data, the participants could arguably offer valuable reflection themselves. As I was the research participant for this thesis, this enabled a systematic capture and observation of process with the benefit of a deeper personal reflection since this work seeks to benefit my creative practice in a long term commercial setting. The problems presented through a researcher-as-subject approach are addressed by the autoethnographical perspective that I have adopted which affords personal reflection within the context of academic writing. By taking an autoethnographical style within the study, I am granted a platform with which to consider my own 'inner dialogue', giving an 'organised and traceable' means of data analysis (Wall, 2006).

These studies of creative process and the affordances of using an autoethnographical style allows me to uncover knowledge about my own process in a way that is beneficial to my present and future commercial practice.

3.3.4. Personal context

After graduating in summer 2013 I began working towards becoming a professional sound designer in the computer game industry. This research is based around my own experience of working as a freelance sound designer within this industry, making sound effects for varying styles of games for different platforms (platform in this context means which game machine e.g. PlayStation, iPad, PC etc.). I have been conducting the work on behalf of an

independent production company called PitStop Productions as a freelance contractor, using Macintosh computers at either the Barnsley office location or from home using my own hardware and software. As PitStop is a company that deals with many game developers (their clients), they employ a two tier working system that efficiently creates a buffer between the freelance contractors and the client. The specification of a project is sent by the client to the in-house managers who are also sound designers. They will filter more exact instructions to me. I can then complete the work with fairly minimal interaction with the client.

3.4. Data collected

Framed by a multimodal emphasis to studying process, the methods that researchers such as Folkestad et al (1998), Collins (2005), Eaglestone et al (2001), Dobson and Littleton (2015) within this body of work have used to gather data are useful as a frame to my own data gathering techniques. To capture a temporal analysis of my work process I have utilised computer screen capture alongside real-time verbal protocol. These methods were coupled with auxiliary data including email correspondence between myself and PitStop Productions and in-depth reflective analysis of the projects as well as and supporting portfolio submission documents. Combined, these elements provide rich and personal insight into possible mediators on my creative process.

3.4.1. Terminology

Screen capture

Screen capture is a method of recording what the composer is seeing on the computer screen in real time. This is an important method of documenting my process as this is where

the sound design takes place. The Macintosh operating system has a screen capture feature built into it by default, making capture of this type of data simple and largely unobtrusive. System audio is also captured within this and is stored in the form of .mov movie files.

Verbal protocol

Verbal protocol is the recording of speech that is, 'thinking out loud' when engaged in an activity to gain understanding into as much of the thought process of the subject as possible (Folkestad et al, 1998). In this instance it is recorded using a Rode NT1-a microphone attached to a USB audio interface and enabled at the same time as screen capture is taking place.

Auxiliary data

Auxiliary data has been saved such as email transcripts, saved as .txt files between myself and PitStop Productions, along with screenshots of original documents such as a progress tracker, work-in-progress card art and project briefings.

3.4.2. Breakdown of data captured

This study focuses on separate sound design projects for computer games. Both are for the mobile platform and are of different genres. The two projects documented are called *Warhammer 40,000: Freeblade* and *Magic Duels: Origins*. *Freeblade* was the longer of the two projects, lasting three months whilst *Magic Duels* took two. I captured data for the projects in slightly different ways: For the *Freeblade* project I used screen capture without verbal protocol along with auxiliary data including email correspondence, and for the *Magic Duels* project I used screen capture along with verbal protocol, and email correspondence.

Warhammer 40,000: Freeblade

1. 20 hours of computer screen capture video with system audio.
 - Recordings are in chunks of no more than 1 hour. Screen capture video files were named according to the date and what time the recording was stopped, for example: '19-05-15-21.34.mov'.
2. Email correspondence
 - Emails were exported to separate text files titled with the subject line.
3. Progress tracker
 - An online spreadsheet document monitored by managers and client.
4. Briefing document
 - A .pdf file with in-depth details of game characters with descriptions.

Magic Duels: Origins

1. 4 hours of screen capture video with system sound and voice-over (verbal protocol).
 - Recordings are in chunks of no more than 45 minutes each. Screen capture video files were named according to the date and what time the recording was stopped, for example: '19-05-15-21.34.mov'.
2. Email correspondence between myself and PitStop Productions.
 - Emails were exported to separate text files titled with the subject line.
3. Card art
 - *Magic Duels* is a virtual card game, digital mock-ups of physical cards were included as reference material.

3.5. Data analysis

3.5.1. *Freeblade*

Having collected real-time data from my creative process for *Freeblade* I first began by analysing the screen capture. I began with a visual approach that prioritised the engagement in different activities on the computer that constituted parts of my sound design process. I was able to identify seven discrete activities:

1. *Looking for source*

This is where I would either browse my sample libraries for suitable source recordings, or if that was not possible, record it myself.

2. *Editing a new sound*

Dropping all the source material into the DAW timeline for editing and mixing.

3. *Open Audition*

I would use Adobe Audition as an alternate editing package, mainly for pitch changes to samples.

4. *Procrastinating*

Any non-sound design activities observed that did not contribute to the work itself.

5. *Synthesis*

When I could not find suitable source material, I would then synthesise my own, mainly using Native Instruments Massive synth.

6. *Away From Keyboard (AFK)*

Times where I was not at the keyboard i.e. break.

7. Experimenting

A work related task that did not fit with other work-related activities.

Having brought the screen capture video files into QSR NVivo I undertook systematic coding which identified the activities I was engaged in during the creative process and stored them as nodes that had a time stamp reference, duration and file name. Figure 1 shows nodes related to the AFK² activity. It displays the file name, how many references made to this activity, the percentage of the timeline covered by the activity as well as the length of the activity in minutes relative to the beginning and end of the video file. After this was achieved with each video file I could then look over the NVivo project and see an overview of the activities that occurred the most.

² Away from keyboard

Clipboard Paragraph Styles Editing

Look for: Search In Nodes Find Now Clear Advanced Find

Nodes

Name	Sources	References	Created On
AFK	7	7	03/12/2015 22:27
Audition Final editing	1	2	08/12/2015 12:44
back to tested idea	3	4	30/11/2015 21:38
experimenting	3	4	30/11/2015 21:36

Looking for source material Audition Final editing AFK

<Internals\\Freeblade\\Screen Captures\\06-05-15-10.17> - \$ 1 reference coded [7.80% Coverage]

Reference 1 - 7.80% Coverage
[11:27.7 - 12:40.3]

<Internals\\Freeblade\\Screen Captures\\14-05-15-21.59> - \$ 1 reference coded [7.51% Coverage]

Reference 1 - 7.51% Coverage
[21:18.5 - 24:03.0]

<Internals\\Freeblade\\Screen Captures\\14-05-15-22.44> - \$ 1 reference coded [6.18% Coverage]

Reference 1 - 6.18% Coverage
[12:30.5 - 14:12.0]

<Internals\\Freeblade\\Screen Captures\\19-05-15-13.46> - \$ 1 reference coded [45.99% Coverage]

Reference 1 - 45.99% Coverage
[0:05.0 - 5:19.6]

<Internals\\Freeblade\\Screen Captures\\19-05-15-14.20> - \$ 1 reference coded [9.50% Coverage]

Reference 1 - 9.50% Coverage
[5:09.5 - 6:29.9]

In Nodes Code At

Figure 1. NVivo coding

Item	Clipboard	Format	Paragraph	Styles	Editing	Proofing
Look for:		Search In	Find Now	Clear	Advanced Find	
		Nodes				
Nodes						
Name	Sources	References	Created On	Created By	Modified On	
AFK	7	7	03/12/2015 22:27	MR	18/12/2015 17:36	
Audition Final editing	1	2	08/12/2015 12:44	MR	08/12/2015 12:44	
back to tested idea	3	4	30/11/2015 21:38	MR	30/11/2015 21:59	
experimenting	3	4	30/11/2015 21:36	MR	14/12/2015 20:14	
Looking for source material	22	48	03/12/2015 22:16	MR	19/12/2015 17:53	
Mentioning Time	6	26	18/09/2015 09:28	MR	01/12/2015 09:24	
New Sound	21	41	03/12/2015 22:16	MR	19/12/2015 17:55	
Open audition	13	19	30/09/2015 14:40	MR	18/12/2015 17:39	
Pop culture reference	1	1	28/11/2015 21:59	MR	28/11/2015 21:59	
Procrastinating	4	5	03/12/2015 22:29	MR	19/12/2015 17:57	
Synthesis	1	2	06/12/2015 10:56	MR	06/12/2015 11:11	

Figure 2. Nodes

Using the detailed view of each of these nodes (Figure 2) I then recorded the lengths of time each lasted in seconds and added them together according to activity using Microsoft Excel.

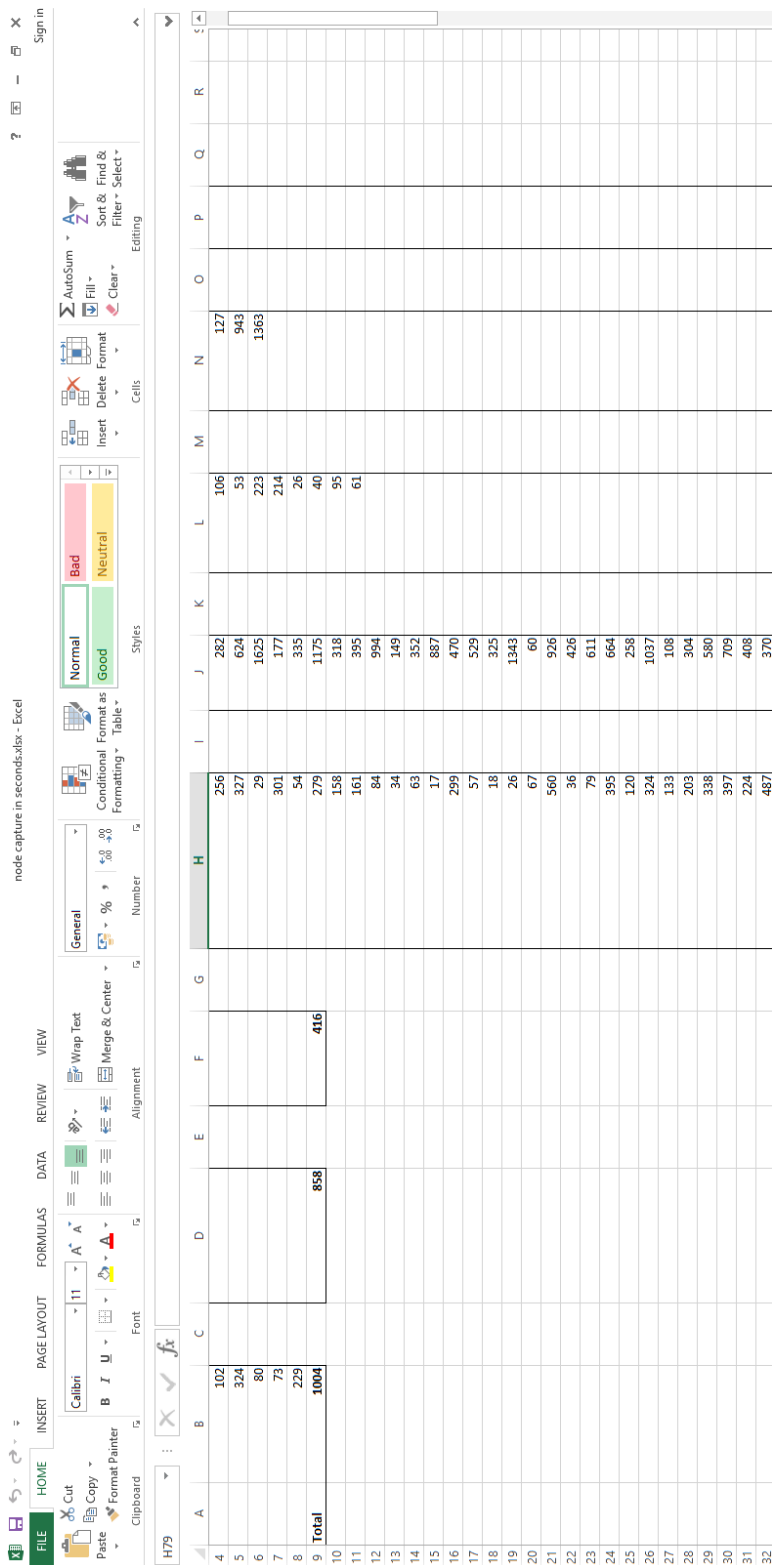


Figure 3. Nodes in seconds, represented in Excel

The totals were then added into this chart to reflect how long overall I was engaged in each activity:

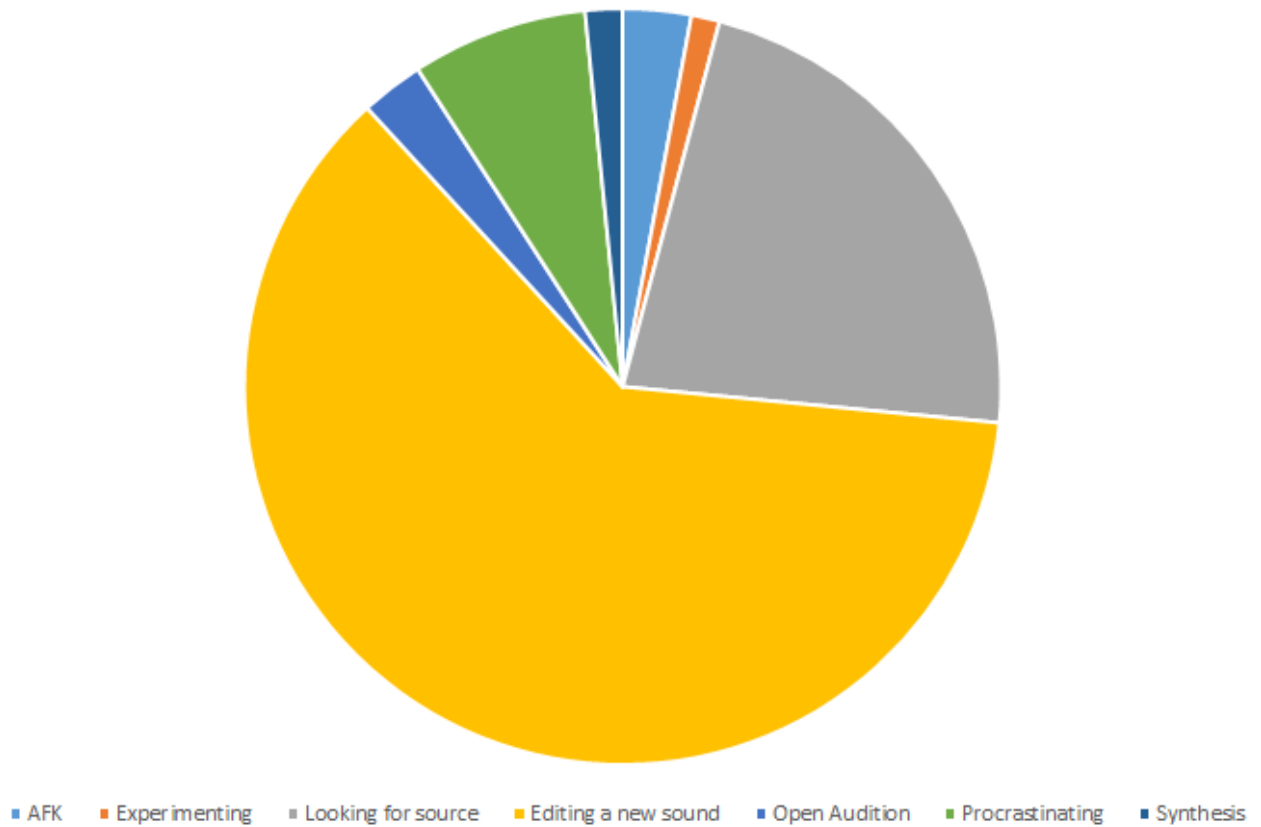


Figure 4. Activity chart

Figure 4 represents the 20 hours of screen capture split into the seven individual activities identified within the capture.

Summary

The data analysis for *Freeblade* provides a largely visual based temporal analysis of salient activities within my process, which leaves it open for my own reflective interpretation within chapter 4.

3.5.2. *Magic Duels: Origins*

The data capture for *Magic Duels* was similar to that of *Freeblade* but with the addition of verbal protocol. The addition of verbal protocol afforded more of a matter-of-fact look into my creative process having actually recorded myself talking about what I was doing and why. 4 hours of screen capture and verbal protocol were recorded in a similar manner over 2 days (20/08/15 and 24/08/15) in episodes between 5 and 45 minutes. *Magic Duels* can be closely linked to the *Freeblade* project as the actual process of creating the sounds were very similar, aside from having a different genre and specification. The .mov files containing screen capture and voice-over were once again imported into NVivo into a new project sub-folder to prepare the coding process. Instead of focusing on whenever a physical activity changed, I focused particularly on time and my verbalisations surrounding this. The reason for this is having conducted an activity analysis on screen capture for *Freeblade* I noticed that time could be a particular mediator in my practice. By analysing this project in this differing way without another visual analysis into activity I can recognise that there is the possibility of inconsistency across projects regarding my process as I designed my methodology later than my data capture.

I again used NVivo to code instances where I would mention the passage of time. Any instance that I mentioned time or how long a task would take I created a node called 'mentioning time'. This process flagged up 26 different instances that time was mentioned over the 4 hours of video capture.

'I don't really have time to be messin' about with this'

'Quite far behind, never mind'

'I should have already done both of them by now'

'I'm gonna call this one, I've been on it too long'

'I'm gonna bounce that cos it's taken more time'

'I'm about half an hour behind, ish'

Figure 5. Transcription extract of the verbalisation of attention to time

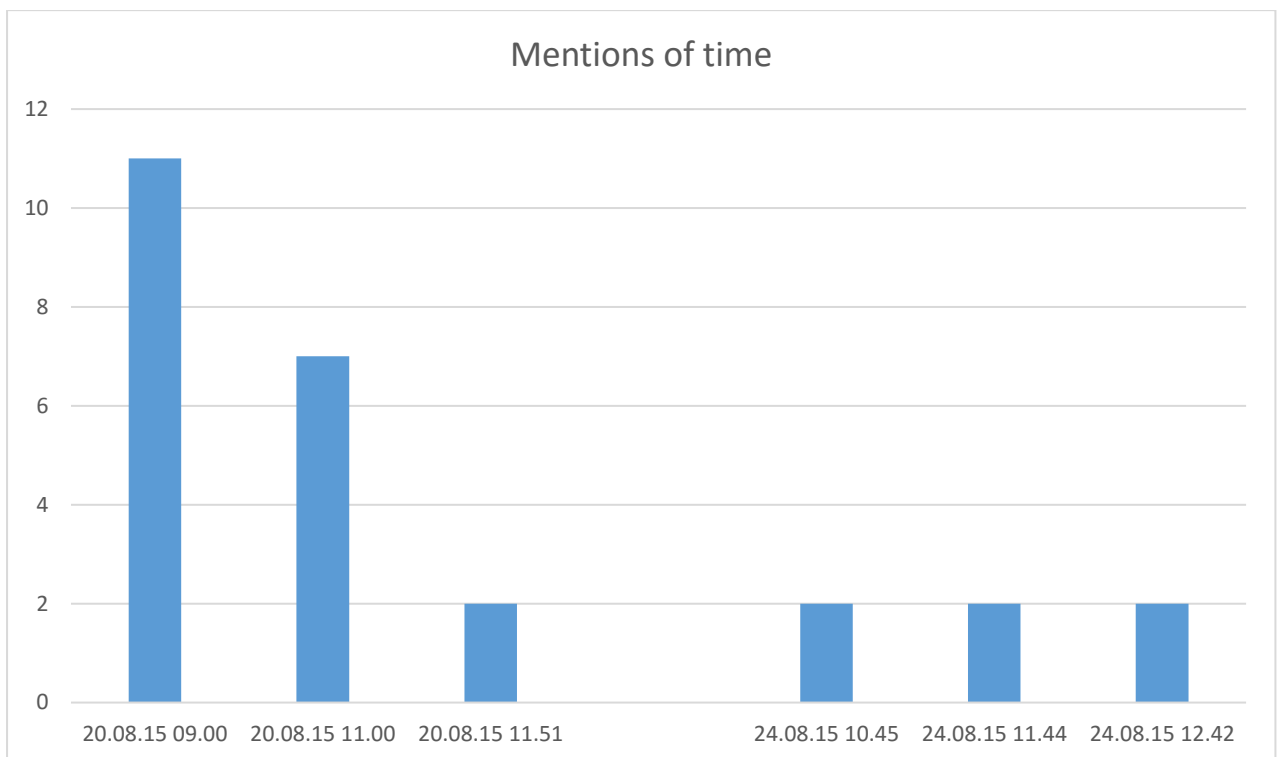


Figure 6. Mentions of time chart

Figure 6 shows on the first day of voice recording that I am very aware of how long I am spending on each sound, having mentioned it in some way 20 times in just over 2 hours of screen capture. On the second day of capture (24.08.15) I just mention time a total of 6 times. There was not any specific activity in which I was more likely to mention time, as with these examples I was at different stages of completion with each sound effect.

Summary

There can be certain logical explanations for the results shown in Figure 6 which appears to confirm a correlation between process and time that, from outside observation, could even be explained as an effect of the introduction of the verbal protocol technique. On deeper inspection alongside gained knowledge on activity from previous visual analysis, I would often change activity or move on to the next sound effect before fully satisfied with the result, pointing to the possibility that my process could have been influenced by both time, and self-observation.

3.5.3. Textual discourse analysis

Textual discourse analysis helps unpick shared meaning within email correspondence (McKee, 2003). Feedback emails contained cultural key-words in the form of suggestions to help embellish or improve a sound effect. Specific terminology is used in the feedback to help describe the response that the client wanted to see reflected in the work.

Hey Harry,

Here are the changes for you if you could look at these this weekend also?? Sorry for the late Friday night dump but I've only just had chance to go through them.

CHAOS_DECIMATOR_LOCOMOTION_MOVE - needs to sound like a heavier machine, seems a little weak

CHAOS_HELDRAKE_DESTROY - Needs a beastly groan - and could we make it sound more off a power down - currently it sounds more power up

CHAOS_HELDRAKE_SCREAM - can we make the scream more of a creature rather than too machine'y?

CHAOS_LORDOFKULLS_BLOOD - This needs to be a more consistent bubbling sound - something a little subtler that loops better - cool sound though

CHAOS_SCORPION_LOCOMOTION_STEP - I liked these but thought they needed a short subtle servo layer - also could we get a few more variants?

CHAOS_SCORPION_WARCRY - Can we make this more creature like hiss? and more of a war cry - Big exclamation of ready for battle!!

CHAOS_DAEMON_WARCRY - Can we make this more of screech - more of an avian beast!

CHAOS_DAEMON_WARCRY - Not feeling this one - could you find something creature'y that sounds like laughter? Other wise something less laughy and more beastly.

CHAOS_DAEMON_DEATH - Don't think we need an impact on this - but just to be sure can we provide it as 2 sounds - impact and death breath - also tweak death breath to suit above changes to Daemon NPC weapons - mostly great - few tweaks

WEAPON_LASER_CHARGE - could we make this a lot snappier (Shorter) and a bit more dangerous - Lower pitch maybe?

WEAPON_SKULL_HURLER - More of a blast needed

WEAPON_SKULL_HURLER_EXPLODE - maybe tweak this once the above sound is tweaked to ensure it doesn't sound weaker

Figure 7. Freeblade email example

Alongside objective technical data analysis, it is necessary to take a more personal approach to reflection on my creative process. In the following chapter I have taken an autoethnographical style to discuss the projects outlined in the methodology.

4. Process reflection

In this discussion I am looking at each project with a more personal and reflective view to gather what other social and cultural implications commercial industry may have on my work process beyond the objective analysis methods I have undertaken using NVivo. This study observed my process of creating sound effects for two computer games. One called Warhammer 40,000: Freeblade and one called Magic Duels: Origins. For the purpose of reflective analysis I am separating these as different entities to define my differing relationship and approach to each franchise.

4.1. Warhammer 40,000: Freeblade

Warhammer 40,000: Freeblade is an on-the-rail³ shooter for iOS and Android based in Games Workshop's 'Warhammer 40,000' universe whereby the player takes the role of an *Imperial Knight* to complete combat-based missions. I was asked to design all of the sounds that would be played throughout the game. This project lasted between 23/04/2015 to 21/07/2015 as a part-time freelance contract undertaken with PitStop Productions.

4.1.1. About the Warhammer 40,000 universe

Warhammer 40,000 is a table top miniatures game by the UK company Games Workshop, whereby each miniature has to be assembled and painted before the board game is played, bringing fans closer to the franchise by developing a painting community as well as gaming community spanning across all age groups. The 'universe' of Warhammer 40,000 is set in a dystopian future where all alien races are at war with each other and technology is worshipped as deity. Main warring sides include technologically altered humans: the 'Space

³ On-the-rail refers to a game type where the main character moves for you without having to direct it yourself.

Marines', 'Orks' a spin on JRR Tolkien's 'orcs' from *Lord of the Rings*, but brought into the future, 'Chaos Space Marines' (a very evil version of 'Space Marines') and 'Tyranids' a hoard of aliens that are inspired by Ridley Scott's *Alien* franchise.

4.1.2. Personal Investment

Having first being introduced to this franchise about 18 years ago I am very familiar with the Games Workshop brand and most of the different warring races and their backstories. This meant I was personally invested in the creation of the game and willing to do whatever I could to ensure the work was a success.

4.1.3. Setting and client relationship

The project was laid out as simply as possible in terms of what in-game sounds needed completing, with the managers at PitStop eliminating much of the bureaucracy involved in starting a sound design project. For example, this included liaising with the client regarding the specifications for the project, including references such as pictures, video clips and project specification spreadsheet. This lengthy but necessary task adds another layer of potential confusion in social discourse between sound designer and client. The managers at PitStop Productions liaised directly with the client with the purpose of streamlining my process to mainly just sound design. With a good understanding of the client requirements and expectations, the list of sounds needed to be created were stored in a google spreadsheet document that everyone involved could edit accordingly.

Sound Brief Workflow						
File Edit View Insert Format Data Tools Add-ons Help Last edit was made on June 1, 2015 by Dan Parkes						
fx Sound Name						
A	B	C	D	E	F	N
Sound Name	Description	Length	Variants	Warhammer Reference	Current State	
1	UI	< 1 sec	1		Review	
2	UI_Nav	As it is a frequently played, this is a tactile but subtle sound.				
3	UI_Nav_Impact	A less frequent sound that is played when the player makes a significant navigation decision	< 1 sec	1	Review	
4	UI_Nav_Back	Used when the player goes back to a previous screen.	< 1 sec	1	Review	
5	UI_Nav_Wargear	Short capture of the ambience of a small factory	< 1 sec	1	Review	
6	UI_Nav_Shop	Glistening gold and the sound of piles of coins	< 1 sec	1	Review	
7	UI_Nav_CampaignMap	Very short drum roll followed with quickly muted crash	< 1 sec	1	Review	
8	Purchase_Standard	Coins exchanged	< 1 sec	1	Review	
9	Purchase_Premium	Like the above with additional sparkle and magic, to make the player feel rewarded	< 1 sec	1	Review	
10	Event_LevelUp	A knightly salute to the player - like a truncated fanfare	2 sec	1	Review	
11	Event_Achievement	A shorter and less impressive sound variant of the above.	1 sec	1	Review	
12	Event_Error	Quick slam of metal	1 sec	1	Review	
13	Loot					
14	Loot_Drop_Standard	The loot flies through the air then lands on the ground. Use similar timing to reference	2 sec	1	Review	
15	Loot_Open_Standard	The loot is unboxed in a manner similar to the pack opening referenced below.	2 sec	1	Review	
16	Loot_Open_Reinforced	The midpoint between the below and above	2 sec	1	Review	
17	Loot_Open_Masterwork	See the references as an example of how we will want this to scale up	2 sec	1	Review	
18	Loot_Equip_Armour	A short clunk of metal being fitted into place	< 1 sec	1	Review	
19	Crafting_Started	This is a short double hit / clanking of metal to signal that the crafting progress has begun.	1 sec	1	Review	
20	Score					
21	Score					

Figure 8. 'Sound Brief Workflow' Document

4.1.4. Project specification and preproduction strategies

Work was split into several different categories depending on what type of sound they were. Their creation priority was also listed within the 'Sound Brief Workflow' document shown in Figure 8:

- UI (user interface)
- Loot (money power-ups)
- Score
- Dialogue
- Environment (ambient sounds)
- Impacts
- Knight (main character)
- Knight weapons
- NPC Weapons (non -player character weapons)
- Infantry
- Ground Vehicles
- Air Vehicles
- Melee opponents

A key part of the creative process was the identification, naming and grouping of sounds.

Each sound had a brief description with it to follow, giving just enough detail for possible experimentation or creativity. As well as the descriptions I was given an annotated

reference document that described the background information of most of the characters.

Various strategies were employed to help my understanding of what would be required in

the sound design. These strategies included reading the reference material descriptions and

making assumptions about how that might sound inside the game and also watching examples of how other games handle similar sound effects.

4.1.5. Cultural influences

Sonnenschien explores the importance of preparing sound effects that connect with the audience in an appropriate 'physical, emotional, intellectual or moral' way to tailor the sound design around the narrative of film. This considered approach to designing sound is relevant in other media such as games, often relying on narrative to remain immersive for the player (Sonnenschien, 2001).

Modern Hollywood action films, for me, are very influential in terms of sound design and altogether sound palette. Since *Transformers* (2006) I have noticed other sci-fi sound design almost trying to recreate this type of soundscape – characterised by 'ultra-futuristic' sounding synthesisers using a varying tremolo modulation effect with moving mechanical metal parts and servo motors. This type of sound effect is very successful as this style of sound design is still used by Hollywood filmmakers and also tends to fill up a lot of the sound frequency spectrum, giving it a lot of impact and excitement due to this (Isaza, 2010).

The Warhammer 40,000 universe is not supposed to be as futuristic as common in Hollywood movies, but is still using technology supposedly beyond what we have today. The client (Pixel Toys) favoured a more mechanical and 'gritty' artistic direction for this game, making it darker in tone and even more realistic. As the main player character is a giant mechanical war suit (called an Imperial Knight), large metal impact sounds and real-life servo motor sounds were used to characterise its movement, rather than detailed synthesised sound with smaller moving objects. Other computer games based in this

universe such as *Space Marine* (2011) and *Dawn of War* (2004) have also made use of such mechanical sounds.

4.1.6. Sound design

With a clear plan set in place I was able to respond to the brief by beginning the sound design. To enhance the speed of my workflow, my preferred practice is to use just one Logic Pro project folder for each sound category. This meant I could quickly move from one sound to the other during the process of completing a weekly submission. All sound mixing is carried out 'on the fly' as quick decisions on equalisation and compression had to be made on a per-sound basis. Whilst sound mixing is an extremely important aspect of creating sounds as it is in music production, the short length of the sounds themselves can help this process due to the sound component's short interactions with each other. This is especially true about small mechanical movements such as footsteps sounds.

Due to the small budget and time constraint of this project I had to use source material from professional sound libraries that many sound and film companies use for this purpose. I used a combination of *SoundIdeas*, *Hollywood Edge*, and *BOOM Library* sound libraries to complete both projects in this thesis. Whilst I would have enjoyed recording all of my own sound source material, the scope of these projects would have taken a team of people about a year to complete, so I opted for the pre-recorded sound library approach in much the same way that an independent composer would use sampled orchestral libraries in lieu of hiring an orchestra.

Approaching sound design using large sound libraries used to be daunting to me when I first started out, especially for *Freeblade*. This was the first project I had worked on for the entire

game and had to learn quickly. The folder structure for the *BOOM Library* sound effects was fairly simple and the sounds are very well recorded with multiple variations for each one. Most sound effects specified within the brief required multiple layered sounds to be created that were able to become prominent in the whole sound frequency spectrum. This required consideration whilst picking out source sounds as decisions had to be made about which files would be present in which particular frequency ranges. My preference for frequency-considered sound design is to take into account four frequency bands: Low, low-mid, mid and high. I often use the spectrum analyser feature on my chosen equaliser plugin (Fabfilter Pro-Q) to help mix the sounds in a more accurate way than just relying on my hearing.

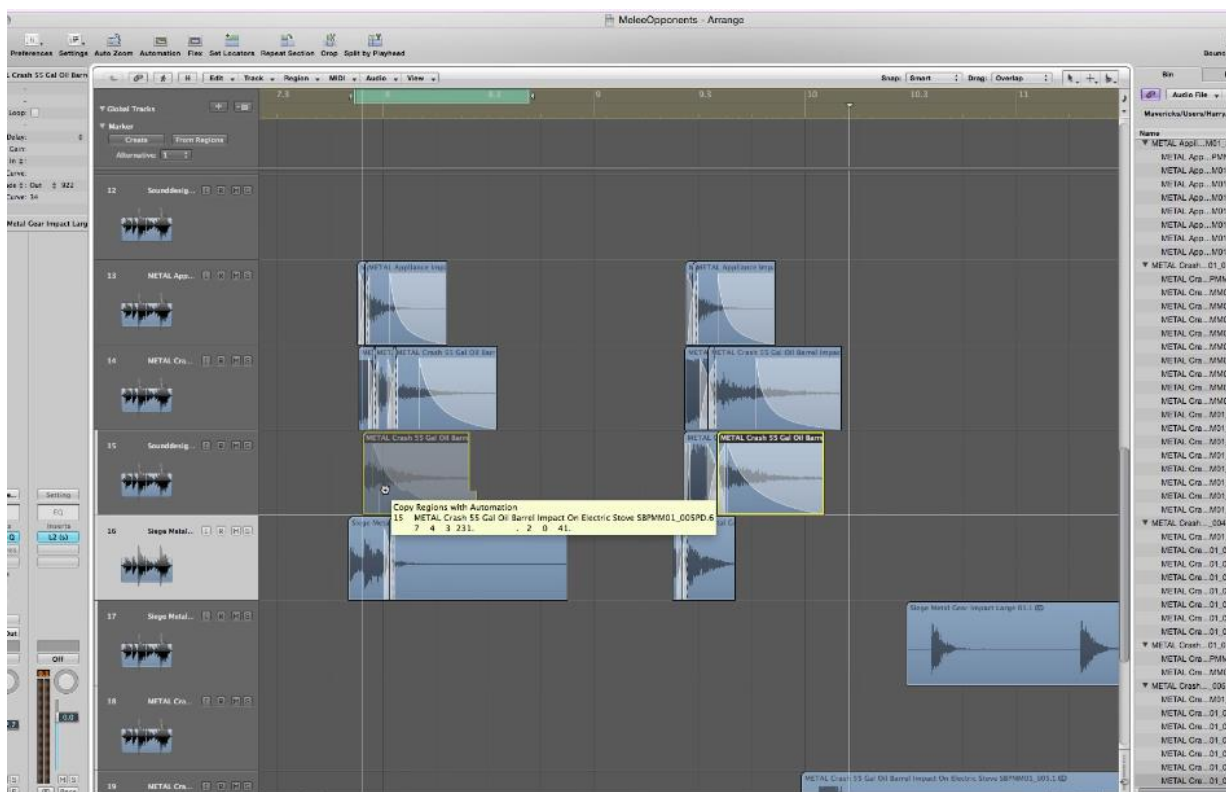


Figure 9. Layered sounds and alternate versions

Many of the sounds in the brief required multiple alternate versions to be created. The abundance of source material at my disposal made this possible as there was usually several

recordings of the same sound in each category. This meant that when I was happy with the first version of the sound, and the alternate versions needed to be very similar but a slightly different recording, I could usually copy and paste the designed sound in place next to the first instant, expand out the source material that I used to the next available sound along, then edit it back into place by eye according to any crossfades included in the first iteration.

Structuring the rhythm of a sound effect has always been a challenge for me since I started video game sound design. Sound effects often need to be comprised of multiple parts to create the feeling of movement. This technique requires a level of knowledge of appropriating non-related source materials to create a sense of hyperrealism for example, a close-up video of a small lock breaking could incorporate the sound of a large metal container being slammed, along with the movement of a heavy chain. Exaggeration of sound effects has played a crucial role in my sound design process to create interesting sonic rhythms within short sound files.

Video reference files were not included for much of this project as many of the sounds can be described as 'one-hit' where there is just one transient within the sound such as a footstep or gunshot allowing me to move directly between many sound effects as I created them. In usual circumstances where there are many video files detailing animations, I compile the videos into one file using Adobe Premiere Pro and import this into Logic Pro so I do not have to keep switching videos during sound design.

Describing my sound design process and decisions behind why I create them the way I do raises questions relating to how my interrelationships with technology, culture and collaborators are mediated by the need to work in a commercial way.

4.1.7. Discussion

Software limitations

I used Logic Pro 9 to complete this work despite this program not being my personal choice of DAW (digital audio workstation). Studies exploring computer-mediated music composition (Cain 2004; Collins, 2005; Burnard, 2007; Chen, 2012) explained how technologies shape the creative process. Relating this to my own work could potentially reveal results about mediation in my own practice. The reason I used Logic Pro 9 was that it ensured that if I needed to work on it at PitStop's studios it would work seamlessly between my own computer and theirs.

Working relationship

My working relationship with PitStop Productions is such that when a project is given, they are able to be flexible enough to work around my other work and university commitments. This means I am able to get the work done on schedule although I sometimes had to rely on working between hours other than the standard 9-5. This points to a possible change in productivity depending on fatigue, shown through the time of day that I am working.

Self-observation

Whilst designing sounds I was also conducting screen capture which actually affected my typical working patterns. Using QuickTime's screen recording feature is simple although the actual recording process uses a lot of computing power as well as RAM to continue recording. This limitation meant that I had to consciously stop and save the video recording up to every hour to prevent the computer from crashing and losing the screen recording.

Editing without auditioning

There are numerous instances within the screen capture where I have chosen to roughly edit together an entire sound effect without listening back to individual parts of it. Despite not auditioning the entirety of the source sound file I was able to complete a rough test of the sound that was similar to how the end result sounded. This practice can be explained in part by my familiarity of the source material I have been using, as well as the physical cues that are present within the audio workstation in the form of a graphical waveform for each sound, revealing the transient and shape of the sound. These observations, coupled with prior knowledge in shaping other sound files ensured that first iterations of sound effects took no longer than they needed to.

4.1.8. Freeblade summary

Freeblade was the first project that I worked on where I was asked to create all of the sound effects. This fact coupled with my nostalgic personal investment in the franchise compelled me to work beyond expectations despite the limitations in my own skill at the beginning of the project, as well as the technological and time/budget constraints. The *Magic Duels: Origins* project was started slightly later than *Freeblade*, this gave me an advantage in beginning of the project as I had become more familiar with my chosen sound libraries.

4.2. Magic Duels: Origins

Magic Duels: Origins is a multi-platform virtual multiplayer card game based on the *Magic: The Gathering* card game series. I was asked to create all the card attack sounds for the game, again by PitStop Productions under the same freelance arrangements as with *Freeblade*. The screen capture and voice over details the progression of my creation of the

second expansion card set that was to be released with an update for the game. This project lasted between 22/06/2015 to 27/08/2015.

4.2.1. Magic: The Gathering

Magic: The Gathering is a popular card strategy game which sees two opponents use customised decks of cards that have fantasy characters and statistics to try to steal each other's life points before the other player can do so. *Magic Duels: Origins* is the brand's latest digital adaption of the game, available on iOS, PC and Xbox One. Virtual card games are gaining popularity with *Blizzard Entertainment's Hearthstone* (2014) being one of the most popular of these. The appeal is that most of these are free to play with micro-transactions being largely unnecessary. Physical card games require frequent spending on up-to-date card decks to be able to compete with other players in person which has let such virtual card games become so popular due to many people owning 'smart' devices such as phones and tablet computers.

Magic Duels dramatises the card playing process by including animations and sound effects for whenever a player takes an action, adding an extra dimension and interest to a virtual card game.

4.2.2. Project specification and preproduction strategies

This project was presented to me in a slightly different way than *Freeblade*. I was provided with list of character names, card art and demonstration action animations that would be placed over the cards when they were played. A spreadsheet was provided detailing the name of the character, along with the client's description of what the animation should look like and brief description of the sound effect.



Figure 10. Example card art

The animation videos provided were captures of the raw animations rendered within the animator's editing software. As these were delivered in the form of short video files it was necessary for me to add these animations together into one larger video file to be able to work quickly within my audio workstation without having to import a new video for each sound effect. I achieved this using Adobe Premiere Pro to import the videos to the timeline, then finally exporting them to a new, single file. The benefit to this is that when imported in to the audio workstation, I could then create markers on the timeline of where each sound should start.

Contrary to *Freeblade's* largely one-transient approach to sound effects, *Magic Duels* required every sound effect to be in sync with animations using a nuanced structure and rhythm to each sound within the character guidelines.

4.2.3. Cultural influences

As with my work on *Freeblade*, cultural influences played a large role in mediating my decisions during the sound design process. Before starting this project I was advised to play *Blizzard Entertainment's Hearthstone* (2014) to experience how sound was used in virtual card games, however *Hearthstone's* creative direction is quite playful and upbeat. Previous *Magic: The Gathering* computer games have taken an 'otherworldly' and horror-like approach to sound effects such as ethereal metal scrapes with tactile elements to create the user interface experience. *Magic Duels* employs a similar reverb-rich horror theme. Keywords used in email correspondence show how this implied meaning could be actioned within my sound design.

In this excerpt from email correspondence, I was given suggestions of how to improve the sounds I had worked on:

Chandra A1 - just missing a bit of impact / boom

Chandra A2 - needs a bit more low end roar throughout, maybe also a muted impact on the end when it sucks in

Chandra A3 - some really bits to this, I just think the build up at the start could be a bit more gradual and a bit more low end roar and boom/impact

Chandra ETB - mostly there, but needs more power to the impact and probably an extra roar sweep throughout most of it

Crush tentacles - generally the right idea, just needs more power and body to it. Would be nice if possible to have a bit more of a powerful crush / squish element to it

General tazri etb - sounds good, but could benefit from a low end boom to accompany the initial impact which could then be followed by a bit of a low sweep shaped with the rest of the sounds in there

general tazri - great, might just benefit from a sharper slash/scrape layer in there to make it feel a touch more dangerous

kalitas tog etb - some nice elements in there, but just feels a bit underwhelming overall - I think it needs a bigger impact, dark/scary/edgy sound that sweeps throughout the animation, and a bit more of an embellishment on the birds flying at the end

kalitas tog - Nice! Just try add in a bit of fang/bite to the bite impact section

kozilek tgd etb - Feels nice and powerful, could just benefit from a little bit more low frequency content. Also, try bring the other layers up a bit (non-impact layers), it seems like there's some nice stuff going on but it feels like it's a bit too much in the background.

kozilek tgd - great, but just needs a bit more low frequency on the impact, and possibly a bit more scrape on the slash

Figure 11. Magic Duels email correspondence

I was able to action the amends detailed in the email by relying on shared cultural knowledge and meaning in descriptive keywords in such correspondence. Terms such as ‘dark/scary/edgy sound’ could potentially mean differing things if myself and PitStop hadn’t previously established this via other referenced material such as the previous *Magic: The Gathering* game.

4.2.4. Sound Design

My approach to sound design process for *Magic Duels* was similar to that of *Freeblade*; however, the specification and types of sounds are quite different. *Freeblade* used an abundance of functional, realistic sound effects to build up a realistic sound environment where as *Magic Duels* required imaginative, atmospheric 'card attack' sounds. This seemingly ambiguous specification meant that detailed references were very important in this project. The sound effects required had to be complex and multi-layered in order to be successful in their purpose. These sounds often have to be played alone at the 'attack phase' stage of gameplay, where few other things are taking place.

Logic Pro X was used for this project which introduces the feature of 'folder tracks', a way in which I can group audio tracks into a collapsible folder structure to save screen space. I found this invaluable for sound design in that I could more easily focus individual sounds in a project folder.



Figure 12. Logic Pro X folder tracks

Each character in *Magic Duels* has to have a certain unique ‘sound signature’ which goes with the artwork of the card, and what type of character they are. This changes the way in which I find source material, as previously I would look for sounds relating to the exact description of the sound required, whereas looking for source material based on character personality and abilities needs to be based on what kind of atmosphere they are likely to portray. I found some characters are easier than others such as ‘General Tazri’ which automatically conveys the keyword ‘military’ but characters such as ‘Kalitas’ is not so obvious.

Video animations were supplied for each sound I had to create. I had to ensure that the sounds I created were synchronised with these animations as some of them can last up to five seconds and require multiple layers of rhythm and texture to become successful. I would tackle this by watching the animation and memorising any impact points with which

to build around. An example of an impact point could be at any point where an element reaches a full extent, or drops fully onto the surface of the virtual board.



Figure 13. Impact of animation

After finding the impact points in a sound I could determine that at these points, the frequency density can be at their highest such as having a combination of low, medium and high frequencies. The perceived power of the whole sound effect will always be that of the largest impact, this is the reason they are completed first. The supporting sounds around the impacts provide movement and it is up to my own judgement on what frequencies they cover. This is usually determined by the character name and 'sound signature' I have chosen for each one.

4.2.5. Discussion

Time saving measures

The length of the animations can sometimes prove difficult to fill with the selection of source material at my disposal. Time-stretching algorithms for audio files differ across DAWs and Logic Pro's time-stretching gives a certain signature to the audio that, on first listen sounds low quality, however in the pursuit of time efficiency I found that this certain sound effect could be used in context with a magic/fantasy sound-world.

Most sounds effects were named after the character they were assigned to within the game. There would often be multiple sounds to create per character, usually an 'attack' sound and an 'ETB' (enter the board) sound, played when a player activates the card. The affordance of these multiple cards per character was that by using the source material built up from each character's unique 'sound signature', the multiple card types could be completed quicker than if it was necessary to find unique source material for each sound, for example, 'Chandra, Flamecaller' used the sound of roaring fires and blowtorches across multiple cards of the same character.

Magic Duels summary

It is clear that the subtle ways in which the specification for the project differs to others such as *Freeblade* can change my approach to creating sounds. The slight ambiguity in the specification of the sounds that needed to be made yielded creative yet functional results where I couldn't simply match specific objects with sound effects. These subtle mediations show that differing projects can become a factor that shapes overall process.

5. Findings

5.1. Main mediating factors

Bringing together both projects analyses and personal reflection as a broad view of my sound design process, there appear to be five main findings:

1. *Time as a mediator*
2. *Correspondence as a mediator*
3. Work from home environment and freelance contract as mediator.
4. Timeframe linked budget constraints
5. Technological limitations as a mediator

5.2. Consciousness of time and time scales as mediators

The findings show that time has a significant influence in mediating my work process, notably on both a conscious and unconscious level. Forced decision making due to lack of time, such as moving on to the next sound without satisfaction that the work was complete led to a learned method of dealing with these constraints that I call 'repetition as a creating strategy'. There is evidence of two different types of time constraint as a factor mediating the work process.

1. *Self-imposed*
2. *Client-imposed*

The self-imposed time constraint refers to my perceived view of how long a sound file should take to create depending on a few key factors. One factor would be that if I was already to work at my other job on the same day, I would have to leave the house at a certain time; the other factor was monetary value and reward, the amount of money I was making from these sound effects afforded roughly 10-15 minutes to be spent on each one,

otherwise there was the risk of diminishing value or negative reward, impacting motivation and creativity (Amabile, 1988). Client-imposed weekly deadlines compelled me to press on with sound effects I was still unsure about as a completed product. As largely subjective work, this type of client-imposed constraint can be viewed as both a positive and a negative mediator. The positive implications of this is that it promotes decisive action when there are multiple possible solutions to completing a sound whereas a possible negative impactor would be sending a clearly unfinished product to the client.

5.3. Budgets involved and possible time affordances relating to larger budgets

Due to the small timescale with which to create the sounds (usually weekly deadlines alongside a full time job), I was not able to record the source audio for the sounds I was making. The reason for this is the sheer amount of custom material that would need recording. To overcome this I relied heavily on professional sound libraries such as 'BOOM Library' (many of their sound packs), 'Hollywood Edge' and 'Soundideas'. These libraries encompass almost all of the raw audio I needed for the project to be completed to a high quality. As well as a time issue this also falls within the realms of a budget issue as well. Had there been a larger budget to record all the source material needed, the necessary time frame would have also been much larger (Grimshaw, 2010). This idea of budget expanding the timeframe with which to work is invariably a key factor in the mediation of creative processes.

5.4. Home/work environment

A challenge in terms of work process arose from the nature of the project being conducted on a freelance work-from-home basis. Being new to working from home I was not prepared for how I would react to it in terms of motivation without having a rigorous schedule laid

out. This is evident due to the varying times at which I have actually recorded screen capture, ranging from 06:00 to 23:00. This however meant that there were observable differences in working patterns, presenting useful information about how I could streamline my future process. The instances of 'procrastinating' within the data capture for *Freeblade* shows that the longest time spent on a non-related activity lasted for 21 minutes from 22:05 to 22:26 on 19/05/2016. This appears to me that I am personally less productive at these late hours, causing me to strategise when I conduct my sound design work in order to be most productive.

5.5. Cultural references within correspondence

There is evidence of mediation on process due to the language used when in correspondence with the managers at PitStop productions. Due to the learned shared meaning of such terms it has had an impact on my process in a positive way. During my verbal protocol capture for *Magic Duels: Origins* I would use terms such as 'whoosh' and 'orb sound' to describe different types of source sounds, similar to the terms that I have been using in direct correspondence with PitStop. This shared terminology helps forge shared meaning in context with cultural references to other types of media such as films and other games.

5.6. Technological limitations as a mediator

It was found that defaults and norms in the software I was using to create sounds directly influenced the outcome of the sound effects created. Evidenced in the supporting material for my final portfolio submission there are instances where I have intentionally used a technical limitation of Logic Pro to create a desired time-stretch effect in my sound effects.

5.7. Implications for my practice

These findings about mediation on process are invaluable to me as a sound designer working in the professional industry. They have shed light on ways in which my process is changed due to its place within commercial context. The multiple ways in which the addition of time constraints has become a mediator shows that it is almost certainly the most important factor shaping my practice.

5.8. Repetition as a creating strategy

I have found that I have subconsciously developed strategies for handling time constraints which I call 'repetition as a creating strategy'. Due to the act of repeating seemingly simple tasks (such as looking for source material or editing a sound in Adobe Audition) I found that memory became an important tool for the source or particular sound editing technique would sound like, to be possibly used in a new sound. Video appendix A shows an example of editing a sound without first auditioning within the DAW.

The benefit of this ability to create in this efficient way affords more time to be spent on genuine problems in the process when faced with them such as unclear briefs or insufficient source material/recording equipment. Although memory is discussed as an inhibitor to creative problem solving (Stein, 1989), its context with in the commercial industry becomes beneficial due to the presence of the time and budget constraints mediating other types of decision making. This learned knowledge of types of sound and how to use them actually improved my creativity over time, with time arguably becoming an affordance due to the memorising of new information. This single strategy has wider implications in terms of my interrelationship with time and technology. By moving a thought pattern and process of editing/problem solving that would normally be completed using the computer, the task

could be changed mostly into memory exercise with the consequence of influencing future tasks by affording those more time, beginning a cycle of positive work process.

6. Creative portfolio submission rationalisation and implications

As this thesis details my study of creative process, it is apt that I consider my portfolio as an outcome of this process. I have included it at the end of the document to show how the end product has been mediated by my interrelationships with my surroundings.

The relevance of this portfolio submission (with regards to my research covering an in-depth autoethnographical study of process) is to show the outcome as a product of its influences.

The research revealed how social and cultural factors mediate process regarding my own sound design practice with the intention of creating a commercial end product. Throughout the practical work I have been unavoidably aware of the research I was conducting and how it may have been shaping the overall outcome, therefore it is necessary to include this portfolio as not only a demonstration of my skills as a sound designer, but as an extension to my personal research and evidence of sociocultural mediation on creative processes.

I have included the two 10 minute gameplay footage videos as a showcase of my sound design in context within the games. The Freeblade footage shows extracts from different levels and environments, showing different types of weapons, enemies and scenarios. The Magic Duels footage shows a similar format, showing a typical Magic: The Gathering game. These videos show that the sound effects work successfully in context on a visual and interactive level.

Each of the 5 minute videos contain selections of sound effects I deemed appropriate to highlight based on my perceived success in creating those sounds. My criteria for success for

these sounds is that 1. They have accurately answered the original brief, 2. Is an inherently interesting and nuanced sound effect and 3. Are in line with the context of other cultural 'gatekeepers' in terms of style, whilst being unique enough to be deemed a creative product. These sound effects showcase evidence of collaborative textual discourse culminating in finalised versions of sound effects, ready to be implemented within the computer games.

Along with the video submission I have included a folder containing all of the separate sound effects that were used for the projects. These were included as a catalogue for reference to hear sounds individually in more detail, as well as serving as evidence of the amount of work undertaken for each project. As sound effects often last less than two seconds I feel it was important to include these rather than relying on sounds within video files.

Evidenced by my textural discourse analysis and observations regarding the use of technology and the impact of time constraints, the end result reveals that whilst context mediates process, the result will also be changed because of this. Examples of these signs of influence can be heard in the form of subtle effects, such as:

1. The use of tremolo modulation effect to simulate movement.

As well as being a popular effect in most sci-fi films, this effect became a go-to for the simulation of movement in my sound effects. Due to time constraint it can be heard in many of the sound effects I have created, including:

Chaos_Heldrake_Locomotion_Land

Chaos_Heldrake_DiveIn

Weapon_Skull_Hurler

PlanetScanning_Loop

chandra_flamecaller_a3

emrakul_end_a1

gisa_geralf_etb

2. The use of time-stretch artefacts as a general effect

Logic Pro has an in-built time-stretching algorithm that can shorten and lengthen any region of sound. If a sound is stretched beyond what its sample rate can accommodate for, it produces 'artefacts' within the sound, giving it a certain effect. This method of time stretching has been favoured for its time-saving qualities when a sound requires it rather than the other 'cleaner' method of stretching sounds that involves opening a dedicated program such as Adobe Audition. The fact that this artefact sound signature has been embraced as part of the sound-world of each of the projects subtly shows the attention to time, whilst simultaneously achieving a creative outcome. Examples of this can be heard:

Orks_GargSquiggoth_Roar_1

Chaos_Heldrake_Scream_1

Chaos_HellBlade_Spawn

chandra_flamecaller_a2

claw_emrakul

devils_etb

kalitas_tog_etb

3. The use of reverb as a stylistic feature

During my time working on Magic Duels, the use of reverb has become synonymous with the Magic: The Gathering brand. The purpose of using such a large amount of reverb is to give the game a certain atmosphere such as the experience of playing the game in a damp, scary dungeon. This stylistic decision was taken before having worked on the Magic: The Gathering brand as a way of setting it apart from other genres and continued throughout the franchise. Implied knowledge of these brand guidelines caused greater care to be taken whilst mixing the sound components together as reverb can cause unwanted low-frequency build-up.

Outcome

The portfolio shows the outcome of my research into creative process as a functioning, commercially viable product. The motivations behind many creative decisions such as stylistic, time-saving measures were directly influenced by cultural mediators, now able to be analysed through my chosen methodological framework. It is interesting that through analysis of process it is now possible to uncover aspects within the end result that show evidence of mediation, allowing me to make conscious decisions within my future creative processes when similar situations occur. By being able to recognise these scenarios where I would usually use a tested problem solving method, I could strategise new ways in which I could tackle these future situations to maintain an equilibrium between efficiency, problem solving and divergent thinking, creating a sustainable model of my practice, due to recognition and consciousness of my typical creative process.

7. Conclusion

7.1. Introduction

This research involved a socioculturally framed exploration of my personal creative process within a commercial context. It captured real time screen recordings and verbal protocol alongside written email correspondence with the aim of finding out what factors played a role in mediating my process and interrelationship with my surroundings. The findings revealed that the influence of time and its implications was an important aspect in my study of process, revealing that in a commercial context, it mediates not only the interrelationship between myself and my practice but also on a cognitive level, gradually shaping the way I develop ideas and meaning.

7.2. What this research adds

Findings from other sociocultural studies of process (notably music composition) highlight similar aspects of process that are mediated by factors such as technological limitations (Eaglestone et al, 2001) and collaborative meaning-making (Dobson and Littleton, 2015). My research contributes to this area of study by addressing ideas such as using an autoethnographical approach, the issue of commercial context, and the study of pure sound design rather than traditional or contemporary music composition.

7.3. Limitations - refining the study

It is clear in the findings that my process is mediated by multiple factors which have the potential to be observed using a more in-depth approach, such as a closer look into how best to improve efficiency when producing commercial works using a more complete dataset than what I have gathered. Whilst my findings revealed more than I had hoped about my creative process, I could have provided a more complete picture of my process

through more rigorous attention to data capture and analysis. The methods I have used serve as a basis for possible future research to be conducted in a similar situation of commercial creativity, For example a greater consistency of data capture could be used to develop a more refined methodology, drawing on techniques I have already used such as mapping activity alongside verbal protocol, and social discourse.

7.4. Personal implications

The process of conducting this study, as well as realisations about its findings, mean I can use this research as a meaningful way with which to improve my future professional practice. Some of the insights shown such as time management and motivation are personal to myself so can be used as a guide as to how to avoid unhelpful situations.

7.5. Implications for creative industry

These findings suggest that there could be further implications for the wider creative industry, with particular respect to the pressure of time and the associated financial pressure behind this. There are always other avenues with which to make valid qualitative inquiry for the study of process, however the considered framing of this project has served as a guide to my understanding of the relationship between creativity and its role within the commercial media industry. This study serves as a reference for future professional endeavours involving creative work. My previous assumption that time served as a negative impactor has been rethought as a mediator that can also serve a positive and multifunctional purpose. It has been shown to directly influence my thought pattern and practice, promoting learned creative problem solving, improving creativity, and efficiency in tandem.

References

Amabile, T. M. (1988). *A model of creativity and innovation in organizations*. *Research in organizational behavior*, 10(1), 123-167.

Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). *Assessing the work environment for creativity*. *Academy of management journal*, 39(5), 1154-1184.

Anderson, L. (2006). Analytic Autoethnography . *Journal of Contemporary Ethnography*. 35 (4), p373-395.

Andrews, B. (2004). How Composers Compose: In Search of the Questions. *Research and Issues in Music Education*. 2 (1), p1-19.

Bennett, S. (1976). *The process of musical creation: Interviews with eight composers*. *Journal of research in music education*, 24(1), 3-13.

Berkley, R. (2004). Teaching composing as creative problem solving: conceptualising composing pedagogy. *B. J. Music Ed.* 21 (3), 239-263.

Bitektine, A. (2008). Prospective Case Study Design: Qualitative method for Deductive Theory Testing. *Organizational Research Methods*. 11 (1), p160-180.

Bransford, J. (1979). *Human cognition. Learning, understanding and remembering*. Belmont, CA: Wadsworth

Burnard, P. (2007). Reframing creativity and technology: promoting pedagogic change in music education. *Journal of Music, Technology and Education*. 1 (1), p37-55.

Burnard, P. (2012). *Musical Creativities in Practice*. Oxford: Oxford University Press.

Burnard, P., Younker, B. (2002). Mapping Pathways: Fostering creativity in composition. *Music Education Research*. 4 (2), p245-261.

Chen, J. (2012). A pilot study mapping students' composing strategies: Implications for teaching computer-assisted composition. *Research Studies in Music Education*. 34 (2), p157-171.

Clindon, M., et al. (2006). A Grounded Theory of Portfolio Working. *International Small Business Journal*. 24 (2), p179-203.

Collins, D. (2007). Real-time tracking of the creative music composition process. *Digital Creativity*. 18 (4), p239-256.

Collins, D. (2005). A synthesis process model of creative thinking in music composition. *Psychology of Music*. 33 (2), p193-216.

Collins, K. (2008). *Game sound: an introduction to the history, theory, and practice of video game music and sound design*. Mit Press.

Csikszentmihalyi, M. (1996). *Flow and the psychology of discovery and invention*. New York: Harper Collins.

De Bono, E. (1967). *New think: The use of lateral thinking in the generation of new ideas*. New York: Basic Books.

De Bono, E. (1970). *Lateral thinking: Creativity step by step*. New York: Harper & Row.

Dobson, E., Littleton, K. (2015). *Digital technologies and the mediation of undergraduate students' collaborative music compositional practices*. Learning, Media and Technology. p1-

21.4

Eaglestone, B.M., Ford, N., Nuhn, R., Moore, A., Brown, G. (2001) Composition systems requirements for creativity: what research methodology? *Proceedings of Mozart Workshop on Current Research Directions in Computer Music, Barcelona*. pp 7-16.

Folkestad, G., et al. (1998). Compositional Strategies in Computer-Based Music-Making. *British Journal of Music Education*. 15 (1), p83-97.

Forber-Pratt, A. (2015). "You're Going to Do What?" Challenges of Autoethnography in the Academy. *Qualitative Inquiry*. 21 (9), p821-835.

Gilhooly, K. J. (1982). *Thinking. Directed, undirected and creative*. London: Academic Press

Grimshaw, M. (Ed.). (2010). *Game Sound Technology and Player Interaction: Concepts and Developments: Concepts and Developments*. IGI Global.

Guilford, J. P. (1950) *Creativity*. *American Psychologist*, 5, p444-454

Hennessey, B. A., Amabile, T. M. (1988). The nature of creativity: Contemporary psychological perspectives In J. Sternberg (Eds.) 1. *The conditions of creativity*. (pp. 148)

Isaza, M. (2010). *The Sound Design of "Transformers" [Exclusive Interview]*. Available: <http://designingsound.org/2010/03/erik-aadahl-special-the-sound-design-of-transformers-exclusive-interview/>. Last accessed 12th September 2015.

Kara, H. (2013). It's hard to tell how research feels: using fiction to enhance academic research and writing. *Qualitative Research in Organizations and Management*. 8 (1), p70-84

Kirkman, P. (2010). Exploring contexts for development: Secondary music students' computer-mediated composing. *Journal of Music, Technology & Education*. 3 (2, 3), p107-124.

Martindale, C. (1981). *Cognition and consciousness*. Homewood, IL: Dorsey

McKee, A (2003). *Textual Analysis: A Beginner's Guide*. SAGE Publications Ltd.

Nam Choi, J. et al. (2009). Contextual Inhibitors of Employee Creativity in Organizations: The Insulating Role of Creative Ability. *Group & Organization Management*. 34 (3), p330-357.

Newman, T. (2008). *The Creative Process of Music Composition: A Qualitative Self-study*.

Nuhn, R., Eaglestone, B., Ford, N., Moore, A. and Brown, G. (2002) A Qualitative Analysis of Composers at Work. *Proceedings of the International Computer Music Conference, Gothenburg, International Computer Music Association*. p597-599.

Osborn, A. F. (1948). *Your creative power*. New York: Charles Scribner's Sons

Osborn, A.F. (1953). *Applied imagination*.

Patrick, C. (1955). *What is creative thinking?* New York: Philosophical Library

Parboteeah, K. et al. (2007). Creativity in Innovative Projects: How Teamwork Matters. *Journal of Engineering and technology Management*.

Parnes, S. J. (1962) *Can creativity be increased?* In S. J. Parnes & H. F. Harding (Eds.), *A source book for creative thinking* (pp. 185-191). New York: Charles Scribner's Sons.

Rideout, R. (2014) *Creativity and Songwriting*.

Rogers, C. R. (1954). *Toward a theory of creativity*. ETC: A review of general semantics, 249-260.

Sawyer, K (2014). *Explaining Creativity*. Oxford: Oxford University Press.

Sonnenschein, D. (2001). *Sound design: The expressive power of music, voice, and sound effects in cinema*. Studio City, CA: Michael Wiese Productions.

Stein, B. (1989). *Memory and Creativity*. Handbook of Creativity. 1 (2), pp 163-176.

Tolkien, J. R. (1967). *The Lord of the Rings*. Boston: Houghton Mifflin.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard university press.

Wall, S. (2006). An Autoethnography on Learning about Autoethnography. *International Journal of Qualitative Methods*. 5 (2)

Wallas, G. (1926). *The art of thought*. New York: Harcourt, Brace & World

Weisberg, R. W. (1988). The nature of creativity: Contemporary psychological perspectives
In J. Sternberg (Eds.) *6. Problem solving and creativity*. (pp. 148)

Wertsch, J. V. (1988). *Vygotsky and the social formation of mind*. Harvard University Press.

Game references

Atari. (1974). *Touch Me*. [Arcade Game].

Blizzard Entertainment. (2014). *Hearthstone: Heroes of Warcraft*. [PC, iOS, Android]. Blizzard Entertainment.

Fitterer, D. (2008). *Audiosurf* [PC Game]. Steam.

Phosfiend Systems. (2014). *FRACT OSC*. [PC Game].

Relic Entertainment. (2011). *Warhammer 40,000: Space Marine*. [PC, PS3, Xbox 360]. Sega.

Relic Entertainment. (2004). *Warhammer 40,000: Dawn of War*. [PC Game]. THQ.

Filmography

Bay, M (Director). *Transformers*. (2006). DreamWorks Pictures.

Scott, R (Director). *Alien*. (1979). 20th Century-Fox