The Importance of Sound Design in Modern Media

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Abstract
This paper is a study into sound design and its importance in modern forms of media such as music, cinema and video games. It will look at how sound design has changed and evolved over the years, and how this reflects the advances in technology and design principles. Past research is analysed and an experiment conducted based on what is found during the review of literature. The experiment asks a group of people of varying ages and sexes to test a short video game developed in flash, which uses a soundtrack to guide the player through a maze and complete the game. A questionnaire is then completed and the results are analysed and compared against what was previously believed before and during the experiment. Results are shown to be advantageous to the continuation of the project and it backs up what other researchers were saying about the topic. Participants are asked if audio or visuals are more important during the game, and a strong majority scores visuals higher than audio. The aim of this paper is to provide more information and hopefully discover new trends and thoughts towards the genre of sound design. It will also show how the opinion towards sound design is changing as technology improves and society is more involved in the digital age.

Introduction
This paper will discuss the importance of sound design in modern media, with a focus on video games. Sound plays an important yet subtle role in modern day movies and games. This project intends to create a simple game using Flash CS4 with the Actionscript 3 coding language. Sound for this game will be taken from open source, copyright free sources and edited within two different types of sound production software; Audacity, to pan the sound and change the sample rate, and Logic, to add compression. This sound will be used in a simple game that will show how sound can completely change the mood and feel of an interactive graphical experience. Through use of a questionnaire, a group of people will be asked to play the game and report their results in a series of four questions. The results of this experiment will be collected and used to show what is most significant in a media setting. It will also allow us to compare what we previously thought before conducting the experiment and if our assumptions were correct.
Films and games have always been both an audio and visual experience. Audio is the human sense most closely related to emotion. If a user has a positive experience with a movie, television programme or game, they will relate to how well the visual aspects of said media were. Audio has a subliminal effect on the user. It is there, it is in harmony with the visuals being fed to the user, but it is hardly ever recognised as a significant part of the experience. This paper intends to explore why audio shies away into the background so much, when it has such a huge effect on our senses. Horror games and movies use sound as a primary resource for atmosphere and emotion. Watching or playing any horror movie/game without sound is an entirely different experience. Medical journals and academic papers that focus on the effects of hearing and audio on the brain will be explored and related to modern media sound.

Previously conducted studies will be investigated. This paper will outline the key opinions and feelings towards sound and how it has changed over time as improvements to technology and design are implemented.

Methodology and Research Approach
Research began by visiting local and academic libraries and reading books that focused on sound design in film and video games. The project had an idea of where it wanted to go, but research was required to try and focus the objective down into an interesting aim. The literature available in libraries was limited in the fact that many books were focused on technical aspects of sound design (such as recording live music or introductions into basic studio engineering, etc.) so, research moved to online resources. This was beneficial as many academic papers that were not published were available here, and important articles written by industry experts were available that otherwise would not exist in a library. Quotes were gathered from papers and arranged into small flash cards that could be physically arranged then placed where they were needed. This helped with structuring the literature review. Most of the papers viewed had 2-3 key quotes extracted from them that reinforced the point of this project. Papers that discussed sound properties and the science behind them were researched to a lesser extent. Learning how sound works in a physical way with the brain and which parts of the body react to music were thought to be of value, as it gave us a better understanding about emotional triggers involving sound. Because this project uses ambient sound, papers discussing this were researched, learning the affects of ambience and where to use it in a game environment was needed before development started for the game. Knowing that ambience can be highly informative during game play sparked the idea for directional information through sound.
It was decided that research would be focused towards studies that discussed trends of sound design and how the subject changes and forms new meanings as new mediums are discovered. Also, research would involve reading studies done on the relationship between sound and visuals, how they worked with each other and how this was relevant to sound design. It was felt that these subjects were important and would allow a proper comparison to be made from the results of the experiment. Also, a broader area of general sound design was researched, from first hand accounts of sound designers working in video games and film, to articles about classical music and how it is interpreted in a natural acoustic live setting. This was done to understand the topic further before beginning development of the game and deciding which experiment techniques to use. Researching these topics before development started was important to get a further idea of how the game would work and what techniques would be used.

For the development of the game Flash CS4 was used. This began by making simple frames which contained a left and right button. Sound was imported from copyright free sources and manipulated using Audacity for pan control and Logic to change the sample rate of the file. There were two different tracks that were panned far left or far right and imported into flash. Using a maze layout drawn in MS Paint(see figure 1.), these tracks were added to the correct frames. The sound is then played through the speakers and the user can 'follow' it by choosing to go left or right based on which speaker the sound originates from. If they choose the wrong way, they are told it was incorrect and to start again, and if they choose the right way, they move onto the next frame and a new track plays, guiding them through a maze to the end goal screen which tells them they have completed the game.
For the experiment a questionnaire environment was chosen as it is an easy and direct way to obtain data that relates to how the user feels about certain aspects that are deemed most important about the game. Data was collected through the questionnaire results and analysed using Microsoft Excel to make spreadsheet graphs which displayed the results in a clear and concise way. Data was collected one-on-one with close friends and family, some of which had considerable knowledge of video games and modern media, and others which had little to none. The age group ranged from 15 years old to 35 years old and 8 out of 12 participants were male. A broad spectrum of participants was chosen as to give more informative results. Four questions were asked. These questions were chosen because they reflected the goals of the project and would result in achieving the data that was needed. It was felt that asking any further questions would result in unneeded data and more time required from the participants. The data was then analysed and compared against other results from the questionnaire. These results were then compared to other authors findings and studies. The questionnaire could have been done online using social media sites to collect data but it was preferred to do it all in person so extra data could be collected (comments and other remarks on the overall quality and experience).
**Game Design**

Cinematography was considered in the design of sound for the game. In particular, a technique used by Hitchcock in Psycho (the violins before the stabbing), Stanley Kubrick in A Clockwork Orange and most war films was researched. This is when beautiful music or sound is used in contrast to an unsettling or violent act being shown on screen. This is audio at odds with visual or a seemingly innocuous scene with audio implying danger. The point is that watching what would otherwise be a repulsive scene would be made much easier to the viewer, which in turn stops them being jolted out of the experience and immerses them further into the viewing through sound. The other side of this is that sound which contradicts the images being depicted draws them further into the image and question or look more closely at the action. This made sense and further reinforced the idea of importance of the relationship between sound and image. Cinematography was the first media to join sound and visuals, so it was thought that learning about how cinema coupled itself with sound would be valuable. Before the advent of electronic sound systems, films were usually played silently with a pianist in the room playing a score as the film was projected on the screen. Films like this used words displayed on the screen to provide dialogue, and the piano player would use appropriate music for the scene that was displayed on screen. They used fast paced playing for a chase scene or slow, sad music for a death scene, using sound as a way to compliment and reinforce the things being shown visually. This was considered when thinking about how to design the game. The game could provide information through sound, which would also compliment the visuals appearing on the screen.

Design for the game began with developing a way to join simple visuals with rich sound. The main objective was to show how important sound is in a simple way which is easy to understand for the user. First ideas included a simple top down maze with sound showing the user how to navigate with sounds, or a dark room which the player must navigate around to find the exit. A storyboard game was also considered, similar to *Myst*, which told a story using a static image, but sound effects and background sound tracks provided hints and information on where to go and how to progress through the game. This seemed like a good idea, but involved too much visual aspects, whereas this paper wants to show how sound can be used without being distracted by visuals.

It was decided to do a corridor roaming game, with the player moving through corridors and having a left or right turn based on sound coming out of the right or left speaker, and the player must follow the sound to reach the end of the level. This was inspired by a mini game in The Legend of Zelda: Ocarina of Time, where the player had to navigate through a “lost wood” by following the music which got louder as they got closer to the correct corridor to go through, until reaching the end of the music trail and being rewarded. This concept was unique and it was thought
that it could be taken and used for a stand alone game as a demonstration of sound techniques.

The sound for this could be recorded and mixed in several ways. It could be produced in a sound design suite such as pro-tools using a MIDI keyboard, then panned to the left or right hand speaker and imported into the game. Another option which should give a more realistic and natural sound, is to take a prosthetic head or Styrofoam head shape, attach a microphone to the left and right side of the head where the ears are located on a human and record the sounds in a live environment. The recording could then be imported straight into Flash without having to mix it in pro-tools or a similar program beforehand. This effect gives the impression, when listened to through headphones, of a very clear 5.1 surround sound to the user, as the sound has been recorded where the ears are located, and gives a very good sense of space when listened to through headphones. There are advantages and disadvantages to both, the MIDI keyboard technique is easier and less time consuming pre-mixing but must be panned to the left or right speaker manually and would take more time in post-processing. The microphone with prosthetic head technique would take longer to record the sound but would require no post-processing. It was decided due to time constraints that the sound for this project would be mixed using an audio processing software called Audacity, in which the track can be panned as desired and then imported into Flash to be used on the appropriate frame. This was done because the software was free and open source, and it was straightforward with positive results. A fast paced, futuristic track was chosen from a selection and implemented. The song was compressed to give it a smoother sound and sampled at a rate of 44000Hz to work correctly with flash.

Flash CS4 was used for the coding and implementation of the game, as it has very good facilities already in place for importing and managing sound files in the game, and time limitations must be considered in every aspect of this project. Frames were drawn by hand and three buttons were used for forward, left and right directions. To each of these, an EventHandler was assigned to a mouse click and the frame moved to the desired location based on which button was used. The buttons followed a pre designed layout to send the player in the correct or incorrect path to the end. This was done because it was simple for the user to understand and follow, and it was also felt that using a simple visual representation would allow the user to focus on sound instead.

A concept that was considered was using different sound tracks in each frame of the game, and having a player choose left or right based on the sound that played when the left or right button was clicked. This would show how sounds can be positive and negative, where the player would choose the upbeat, happy sound to continue or a downbeat, sad sound to lose the game. It was felt that this
would be too ambiguous in terms of emotions, when it is entirely subjective what a person thinks is happy or sad. This problem is discussed by other authors below in the literature review, which tells us that study into the emotional aspects of sound is hard because of the subjectivity of it, which holds back progression into the field. It would also require a significant amount of individuals for study because the results on a small group would be too vague, which requires more resources than this paper has.

Literature Review

How does sound design affect our perception of modern video games and media?

Sound is an extremely important part of our communication and has been all throughout history. It was used for storytelling, was seen as mythical and people attributed it to the gods. From the thunder of waterfalls to army’s of the past using music to bolster morale and rally troops, it plays a huge role in our history. Sonnenschein (2001) tells us “Through sound we can trace the evolution of religion, music, language, weaponry, medicine, architecture and psychology, not to mention cinema”. From this we can see how important and deeply rooted into culture it was. How has sound changed over the years? How has technology influenced the changes to sound design and production?

First came MIDI, second was the arrival of the CDROM, and this current period sees the arrival of better sound cards allowing 5.1 surround sound and real time sound treatment, i.e. bullets flying over the players head. As technology improves, it allows sound designers and producers of music to be much more adventurous when designing sound, and create much more immersion worlds that mirror how sound and ambience work in real life. “We are entering a third period in the development of sound within games” (Veneri et al.). With these advances in technology, long past are the days of 8-bit music that, while fitting in its setting and captivating many people, hardly pushed boundaries in any way. Surround sound is an important part of the advances in sound production and design, especially within video games, which strive to simulate real world experiences. Collins (2008) tells us sound could be released on a new medium thanks to video games : “It is even possible-since music encoded into games is less easy to copy than orthodox CDs or MP3 files-that a great deal of popular music might be released in game form over the next few
years, and this in turn might put the composition of game music as it has evolved up to now in some jeopardy”. Think of a popular artist not only releasing a song, but including a form of interactive entertainment that can be released alongside it. This shows how far we have come and how video games should be considered an important media for sound, not only in design but in technical advancements.

Marty O’Donnell, Audio Designer at Total Audio studios, said “you must know exactly how different game states will affect the differing types of audio” (from Saltzman, M 2000) For instance, does the state require sound effects, ambience, or a sound track? Designers must have a firm grasp on this concept to create meaningful sound design.

Sound can immerse its user into the media they are viewing, but to do so it must follow and reinforce rules of the game. “Sound Design must underline the rules that model the game world in order to increase its consistency” (Veneri et al.) This can lead to difficulties in designing sound, as games have an ever changing structure to their design. Creating music for a structure that changes as it used is difficult, and Winkler (1999) tells us that “One of the new challenges facing composers of interactive works is to create malleable forms based on flexible musical structures that respond to human input” Collins (2008) also comments on this by saying “Game music is almost alone among music forms in being non linear: it must make some sort of sense even without a set beginning, middle and end” These authors agree that the concept of non-linear sound is challenging, and it takes considerably more time and effort to create. In terms of hierarchy, sound is below visual game design, but can sound be used as the primary form of information and have the visuals designed around it? Gardenfors, D (2003) wrote a paper on designing games for hearing-impaired patients, and explains that “If approaching the game design from a position where sound is the central medium and the graphics, when present, are added to complement the sounds, it is possible to create games that offer new and innovative challenges” He also states “The key points when designing sound based interactive media are how to design sounds that can communicate the events and the status of the system, and how these sounds should be arranged spatially and in time.” For instance, a sound effect or voice telling the user they have successfully reached a goal must convey the point well. Using spatial awareness to direct the player and using tempo or speed of the music to tell the player to speed up or slow down is all possible, and as this author says, is challenging and rewarding. “Mediated sound is a big part of our lives- alone and in combination with images. Music, voice and environmental sound inform us, entertain us and move our emotions. Despite our cultural visual dominance, effective communication through sound is a powerful tool” (Breslin, J.R
Composing music for computer media requires a different approach than one would use in a traditional setting. Winkler (1999) tells us that “It is essential to break free from the limitations of traditional models and develop new forms that take advantage of the computer's capabilities”. This means developing sound for video games requires an awareness of how and what the technology you are using can do. If we take full advantage of it, the sound design can be improved. Sonnenschein (2001) tells us that immersion is an important part of sound, and the designer must also be immersed when creating it: “A true sound designer must be immersed in the story, characters, emotions, environments, and genre of the film”. This tells us satisfactory sound is created when the designer feels every part of the media and has a strong connection to it. Surround sound can use this particularly well in creating a sense of space: “the deployment of ambience in surround sound speakers addresses the construction of (both cinematic and theatrical) space” (Whittington et al. 2007)

Sound design is seen as a lesser art, and Tim Larkan, Audio Engineer at Cyan and Lead Audio Engineer for Riven, The Sequel to Myst states “sound design in games is 50% of the experience with 10% of the bandwidth”. This means sound designers can be overworked with not many resources available to them. Why is sound design seen as less important, when there is evidence of it having significant impact in the design world? “Despite being a promising and lively playground, sound design is not a discipline as solid and established as visual or product design. We believe that the reason is to be found in the lack of design-oriented measurement and evaluation tools”(Susini et. Al) The genre still has much to learn in terms of adapting to new technology and design practices, and it would seem hard to raise awareness for these problems.

Emotion in sound

Of all the human senses, sound is the one closest related to emotional responses in the brain. Zentner et al. (2008) tells us “One reason for the universal appeal of music lies in the emotional rewards that music offers to its listeners”. This tells us that for sound to contain emotion and trigger feelings in the user, it must be personal and relatable. If it contains an element of human thought, the emotional response will be greater. Gang et al. compares live concert music to electronic MIDI based recordings, and says “Midi renderings (sound produced by digital synthesizers) are often uninteresting and emotionless in comparison to the performances of great musical artists”. This backs what Zentner et al. says in the fact that sound played by a human and in a live setting
compared to a digital, computerised recording has greater emotional reward. According to this, the same piece of music played live would have higher emotional meaning and power, compared to listening to the electronic recording through speakers. This shows that emotion is a powerful and complicated subject, and challenging to get right.

Sound affects humans in a strong physical way. We feel fear when something is loud or angrily shouting at us. Barfield (2004) states: “Sound can have pronounced effects due to the physics of the sound itself”. Additionally, “The most powerful emotive sounds are those that play a part in the human communication i.e a child crying, someone shouting”. This is a strong connection physically that we have pre programmed into our minds through evolution. These facts can be used when developing sound for a game, such as a child crying to invoke fear or panic, or a man raising his voice to show anger or rage. Just hearing these things, without any visual aids, can trigger emotional responses we desire when designing sound.

Background sounds, ambience and noise are extremely important for immersion. Misara et al. (2006) states “Many sound synthesis techniques focus on generating foreground sounds, which by themselves do not generally give the listener a strong sense of being in a real-world environment”. Ambient sound can provide information to the user in a very subtle way. The mosque prayer and bustling market could tell a user they are at the Grand Bazaar in Istanbul, or the hooting of an Owl could express the time of day. These are small things that take up little development time and increase the immersion of the user greatly. This paper wishes to use ambience as a directional information tool, allowing sound to guide the player through a maze.

In a paper about expressing emotions in robots through facial features, Jee et al. (2009) states: “Our approach to expressing a robot's emotions is inspired by movies without sound. These movies never have the same impact as one with music, setting the tone and suggesting the mood of a particular scene”. Additionally, “The experiments of our earlier work showed that music could convey stronger emotions than a facial expression and improve the emotional influence when emotional sound is combined with facial expressions simultaneously”. The emotional content of a media will assist the brain in relating sound in a film or game to the visuals in said film or game. The link between the two must be strong and relevant (as Zentner et al. said above) to trigger emotional responses.

Sounds paired with images trigger strong emotional responses (Gejun et al. 2009) and sound helps us realise and comprehend images we are seeing on screen. “Sound and image matching is a
very important element the film and animation world. Analysis of sound and image theory tells us emotion plays a decisive role in the sound and image matching process.” (Gejun et al., 2009) This reinforces what Jee et al. said above, which was that using visuals with matching sound increases the emotional responses. Additionally, “from the development of original black and white silent film to all kinds of modern media artworks, the creators have paid attention to sound and image matching. Sound has always been regarded as an essential element in media art works” To further this point, using visuals to improve sound is possible, as Hiraga et al. states: “We consider an appropriate environment with visual aids could help more hearing-impaired people enjoy music”.

Sound plays an important part in media and is vital if the creator wants their audience to feel strong emotions. This is especially true when combined with visuals. Breslin (2003) comments on this by stating: “Audio Media, when combined with visuals in movies or video games, changes or enhances the experience of visuals alone”. And “Environmental sound can set location, time of day, year, and give information about who or what is present”. Wind whistling or the patter of rain can tell us what the weather is like before we even experience it, and the same can be said in a virtual setting. Using environmental sound is a key technique when immersing the player, as it can strongly influence how the player feels towards the visuals and the game play experience.

Recognising emotions in music is hard to achieve, but research continues on the subject. “Recognising musical mood remains a challenging problem primarily due to the inherent ambiguities of human emotions”(Kim et al. 2010) This means that because human emotions are considered vague and subjective when looked at from a scientific point of view, they are difficult to realise. The writers continue by saying “Music itself is the expression of emotions, which can be highly subjective and difficult to quantify. Automatic Recognition of emotions (or mood) in music is still in its early stages”. This tells us that as technology advances and new study techniques are formed, we can fine tune which types of sounds trigger which emotions, and create a template that can be used when designing sound for games or films.

Humans are connected constantly with sound and the emotions we feel are derived from sound. This feature, if used correctly and implemented into modern technology could significantly enhance the users experience. Schuller et al. tells us “Listeners feed back emotion to any sound they are listening to in their daily life, no matter what kind of sound it is and whether the sound itself is subjective or objective. Sound perception is thus wrapped up with emotional response and effect: Infants first attempts to overcome anxiety are centred on sound making, and that it can also be
important for future intelligent systems to have such a comprehensive sound emotion 'perception' ability”. This study shows how sound is used in our daily lives, and reflects what Barfield(2004) tells us above, that sound which is personal and relatable to the listener will have a stronger emotional effect. It also shows us that as further technological advancements are developed, so will the ways which we use sound to trigger emotional responses to the listener. This reflects what Kim et al. found, that technological advances are important for sound design to improve.

Jee et al. (2007) writes a paper on differing emotional effects in music and how they are associated with musical factors. This study is one of the most important to review, as it contains key information on difference in musical factors and how they can be used within media.

“Variations of musical factors induce different emotional effects. We consider six : Tempo, Key, Pitch, Melody, Harmony and rhythm. Fast Tempos Signify happiness, joy, anger and fear. Slow tempos are more indicative of sadness, tenderness and serenity” (Jee et al. 2007) This tells us when producing sound, the creator must be aware of how these factors work to achieve stronger emotional responses in situations. If a particular scene is exciting, a fast tempo and rhythm can be used to invoke the appropriate emotions. A Scary horror scene would involve using slow, tense rhythm and a minor melody to add fear to the scene. These are techniques which have no visual properties, but affect the visuals and compliment them in a subtle way, to increase particular levels of emotion as the designer sees fit.

In another paper by Jee et al.2009), he outlines an experiment which showed a group of participants several different facial expressions on a robot and a piece of music was played (sad robot face with sad music, etc.). The users were then asked which element of the experiment had the strongest emotional effect. The results showed that the group were affected strongly by the music, and moderately by the visual aspect. When played together, they had the strongest affect. This tells us sound has a strong impact, but coupled with visuals can tap into emotions in a profound way. It also reflects what previous authors have said, that sound is the sense most closely related with emotion and when it is used in a visual setting, the results are strongest.

Where does the emotional reaction to sound come from?
Part of the brain (the orbifrontal cortex) contains emotional response receptors and is important for recognising emotion in sound, when it is removed this is lessened. A medical trial was conducted in which parts of the brain that are known for controlling and recognising sound were missing. They tell us “bilateral or unilateral lesions circumscribed surgically within the orbitofrontal cortex can
impair emotional voice and/or face expression identification” (Hornak et al. 2003). This means when the orbifrontal cortex was removed through surgery, emotional recognition in sound and facial expression recognition were impaired. This shows us that the orbifrontal cortex plays a large part in attributing emotion with both sound and facial expressions.

In a study conducted by Trost et al. (2011), they found several neural components that are not traditionally considered 'emotion' areas of the brain such as memory and motor pathways, which if used somehow in sound could evoke much stronger emotions. “emotional responses to music might reflect extra-musical associations (e.g., in memory) rather than direct effects of auditory inputs”. This means that instead of believing that emotion is simply a physical response to auditory inputs, it has relations to mental reactions, like triggering memory response.

**Summary of Literature**

The literature that has been studied above tells us that sound is strongly related to emotional response, and when paired with visuals can enhance both the visual and aural experience. If this is used correctly within a media such as video games or films, the emotional rewards will enhance the users enjoyment of said media. With advances in technology such as the implementation of surround sound in recent years, the way sound is designed is in a constant state of change, and the designer must be aware of these changes to accommodate correct sound design within the media. Recreating real-world experiences with sound can be recreated with the implementation of these technologies, and with this, the sound is relatable and more powerful. Sound design is considered a lesser art form and, according to sound designers based within the games industry, is given less that adequate resources to work with. This leads to sound being understudied and underestimated in terms of importance within media, and the difficulties of gathering data based on the subjective emotional responses add to this fact.

Studies into the subject of sound design and how it causes emotions all agree that sound which is relatable to the user has the strongest emotional influence, and if this is considered when designing or producing sound, the user will have a more rewarding experience. We can create locations, time of the day and seasons of the year through sound without doing anything visual. This technique is extremely powerful as it is easy to implement and takes little resources to accomplish.

There are basic instinctive responses toward sound such as feeling the need to flee as a growling monster approaches or panic and agitation toward a crying baby. These can be used in a game or film setting to trigger desired responses from the audience. The fact that sound within video games
is non-linear is also seen as a challenge, having the correct sound for any number of changing variables is a hard thing to accomplish, but could be seen as an opportunity for sound designers to expand their creativity.

**Summary of progress against original objectives halfway through the Dissertation**

Original objectives were to conduct appropriate research into the world of sound design and how it affects us whilst we interact visually with media. The research here is suitable for this and represents the purpose of this project truthfully. Design for the game is in place and the project has a clear direction in the coming months, which means the next phase can begin quickly. The research conducted shows this project is an interesting and worthwhile one to undertake. This project intends to have all the sound recorded and mastered, ready to put in place when the game is being developed, by the start of February. Research will continue in the month of January in relation to making the game and how to best implement the features it will have. Microphones will be acquired from the music department at Paisley University. If this fails, they can be rented and an acquaintance who is a professional sound engineer can assist with recordings. The project must have a first draft of the paper and game ready for around mid April, to allow the supervisor to look over everything and advise on any changes that must be made.
Research Data Results

After completing the game and having it ready for testing, a small group of people were asked to play through the game on a laptop and fill out a questionnaire form after completing the game. Data was then collected and arranged in a spreadsheet for analysis, which will be presented and discussed in this section. Each question asked will have a graph or pie chart showing the results and a discussion below each graph.

Figure 3

Figure 3 shows how each individual marked the graphical properties of the game in yellow, and the sound qualities of the game in orange.
Figure 4 above shows the result of the question “Would you play a similar game to this one if it was developed using a larger team and had longer development time?”. The majority answered yes, showing interest in the subject, whilst 3 answered no and 3 answered maybe.

Figure 5 above shows us the results of the question “Did you feel the lack of graphics hindered your enjoyment of the game? The results are equal in that 4 people answered yes, 4 answered no and 4 answered Possibly.
Figure 6 above shows us the sex of the subjects used for testing, with 8 males and 4 females. This was so there would be input from both males and females.

Figure 7 shows us the ages groups of the participants. These were chosen to give a spread of results from differing age groups.
Discussion of Data

Analysis showed that there was a significant difference between the audio and visual preferences of the study participants. The older age groups (25-35) scored overall lower marks for both audio and visual, and the data shows that there is a significantly higher score overall for visual preference over sound. A significant portion of participants (6 out of 12) told us they would definitely play a game similar to this one if it had a full development team and a longer production period, with 3 telling us they maybe would. The results from figure 5 were completely equal, which is surprising as it shows no significant opinion taking the lead. The participant that scored the lowest overall with low scores for question 1 and 2 and answering “no” for both question 3 and 4, was also the oldest participant involved. She was also one of the four females.

Figure 3 shows us the results of questions 1 and 2, which asked the participants to rate the audio and visual experiences on a scale of 1 to 5. We can see from the results that their was a clear preference over the sound aspect compared to the audio one, with 91.6% of participants scoring the sound aspect over 3, whereas only 16.6% scoring the visuals 3 or higher. 91% of participants scored the visual aspect 2 or lower, with 33% of them scoring a 1 or lower for visuals. This tells us there was a significant number of people valuing sound over visuals as the contributor to their enjoyment of the game. This reflects previous assumptions made before the testing began. It was hoped that the results would show a significant difference toward sound over audio. Why could this be occurring? We can look at research conducted in the past and find similarities between these results and results from other studies conducted. Jee et al. tells us that, after studying a group of people reacting to sound and facial expressions on robots, the results were that the group was affected profoundly by the music, found it to be the most emotional and relatable aspect of the study, and was key to their enjoyment during the test. This reflects our results in the study we conducted, as a significant portion of participants thought that sound was the main contributor for enjoyment during the game.

One of our participants said “The sound track was really modern and sounded like something in the charts just now. That made me enjoy the game a lot more”. This was particularly interesting, as it shows that if sound is relatable and modern, they enjoy it much more. This participants was one of the youngest that took part, at 18 years old. This brings up another point, in which the scores overall for both sound and visuals were lower as the participants we asked were older (25-30+). Zetner tells us that if sound contains an element of relativity, the emotional responses will be greater. Did the older participants score lower because the sound track is new and that the genre used (Drum & Bass) is generally targeted towards younger audiences? This could also relate to
what Trost et al. (2011) talks about when they discuss motor pathways and memory triggering responses in music. If the older participants scored lower, perhaps it is because these memory responses do not trigger due to never or rarely listening to that type of music?

Participant 3 was both the youngest one questioned, at 18 years old, and male. This participant scored both the lowest score for visuals (1) and the highest score for sound (5). He had the largest difference of opinion between sound and visuals. This is interesting as it tells us their can be significant separation of sound and visuals in a video game environment. One of the goals of the project was to find out if the average video game user could recognise a separation of sound and visuals, and use sound as the main source of information within the video game to guide them through a task. This reflects what Masara et al. tells us, that ambient sound can be used as and information source in a subtle way.

Figure 4 shows us results from question 3. It tells us that 50% of the participants would play a game similar to this one if it had more development resources put into it. In our review of literature, we hear Tim Larkan say that sound design for video games rarely has sufficient resources provided, and sound designers are generally under-worked and under-appreciated. We believe that if more attention was given to that sector of design, a commercially successful game could be released that focused on sound.

Figure 5 shows us the results from question 4. These results were disappointing, as no particular answer was in the majority. This could mean that people are not very sure about how graphics affect the enjoyment of a video game, and we speculate that because the emotions sound can trigger are subliminal and in the background, the general user of computer games feels that emotional sources are a grey area.

Figure 6 shows us how many males and females were involved in the study. This was purely to show the study considered opinions from both sexes to get a broader response range. We saw no particular difference between the results from the males and females (this was not a goal of the study either).

Figure 7 shows the age range for participants involved. The largest group was 21-25 year old, and they all scored fairly average results for both sound and visuals. It is interesting that the most radical scores came from the lower and higher age groups. Could this be because of a cultural and generational difference, or is it simply because younger and older people can have strong opinions?

We can see that the data and evidence provided from the experiment supported our previous findings and assumptions. The main points to look at are that participants could make a strong
distinction between the sound and visuals, and that they found the idea of a sound based game to be promising, if a full time development team were to make one. Also, the majority of participants scored audio higher than visuals, which is what the project aimed for before starting the experiment. Past literature told us that audio could be a main factor when designing a game, so we knew we could do it if the game was designed correctly.

Concluding Remarks

Throughout this project their was a belief sound was under-appreciated and was rarely used to its full potential in modern video games and movies. The research has backed up this idea, and the area is still mostly unexplored. Audio and sound have a very strange connection to each other, when separated they both are underwhelming, but when combined they compliment each other extremely well. This project intended to explore the grey area in-between sounds and visual, and see how far the boundaries could be pushed while still maintaining its integrity. The experiment undertaken reflects my previous assumptions before starting the project. Sound can be distinguished from visuals as a source of emotion and information, but the user must be made aware of it and put thought into the game they are playing. Sound is highly reliant on technology, and sound designers must be aware of the advances to hardware and new design techniques to succeed. Results of the experiment undertaken show that sound-based games are a possibility, and that they can be just as engaging and enjoyable as a regular, visual based game.

If the project would have put more time into the actual game, and if the experiment was carried out with a much larger group of people, possibly through the use of social media sites, this would have produced a larger range of data and thus more focused results.

This project concept is in early development, and ideally more resources will go into the next stage. Ideally this would involve more than one person designing the game, a professional sound designer, and more development time. Much has been learned from this project can be implemented into the next stage. Due to the results produced within this project, the concept could result in a successful game. There is confidence about continuing the project and making a full scale video game.
References

[1] Veneri, Olivier; Natkin, Stéphane; Le Prado, Cécile; Emerit, Marc : A game audio technology review


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Minutes for meetings with supervisor

First meeting

Date: 18/10/12

Issues discussed and actions agreed upon:
Agreed on specification for design of game, Begin research into the subject

For next month:

Plan Literature Review
Plan Design Methods
Beyond next month:

Finish Lit. Review
Begin Methodology

Second Meeting

Date: 15/11/12

Issues discussed:
Talked further about parts of design for the game, how would I convey importance of sound etc., Research and finding literature to quote, advised on how to get more references etc.

For next month:

Further lit references
Work on literature review
Work on Methodology

Beyond next month:

Finish Lit review before Christmas
Finish methodology chapter

Third Meeting

Date: 6/12/12

Issues discussed:
Continuing work on literature review
Advised on writing techniques and which fonts to use etc

For next month:
Get more references and finish up literature review
Finish literature review by 7th January
Finish methodology by 7th January

Fourth Meeting
Date: 17/1/13
Issues discussed:
talked about techniques using Flash, how my game would look, started work on building game
Continue building references for literature, continue researching other studies into the subject

For next month:
Finish literature review
continue working on game
Consider how it will be tested

Fifth Meeting
Date: 28/2/13
Issues discussed:
finishing literature review, polishing it, finishing methodology for the game and testing
look at progress on game and testing

For next month:
Finish expanded methodology
Consider finalising game and think about starting testing

Sixth Meeting
Date: 28/3/13
Issues discussed:
Viewed dissertation, recommended restructuring certain parts of the essay
Finished game looked at

For next month:
Have testing finished and have dissertation close to complete, ready for first draft review
Seventh Meeting

Date: 18/4/13

Issues discussed:
Feedback on first draft of essay, talked about the experiment results
Discussed further things to add to data analysis
Get ready to hand in completed project on 26/4/13
COMPUTING HONOURS PROJECT SPECIFICATION FORM

Project Title: The importance of Sound Design in modern media

Student: Ross Convery
Banner ID: B00199586

Supervisor: Dr. John Sutherland
Moderator: TBA

Outline of Project: Sound design has been a crucial part of how a video game feels to the user. It can add ambience through music, hold attention through sound effects, and convey information to the user. I am going to explore the ways in which this is implemented and strong examples of sound design, as it plays a large role in game design.

I intend to research various sound production techniques used in games and how they strengthen a game (I will also research sound design in other media such as cinema and television). I will create a simple game that focuses on sound as a main design element to improve the gameplay.

A Passable Project will: Have suitable research conducted and a reasonable example of how an aspect of sound can affect a game.

A First Class Project will: Design and build a game that conveys the importance of good sound design with respect to speech, sound FX and music and analyse how these can immerse and involve the player into the game.

Reading List:
- Sound design to enhance presence in photorealistic virtual reality by S. Serafin and G. Serafin, 2004
- Designing auditory spaces to support sense of place by P. Cheung & M. Marsden, 2002
- 3D sound for virtual reality and multimedia - R. Begault, 1994
- Processes and tools for sound design in computer games - V. Gal, 2002
- Game sound: an introduction to the history, theory and practice of video game music and sound design - K. Collins, 2008

Resources Required: Researching using the Internet and UWS Library. Using Adobe Flash v.4 for creating the game and Ableton/Logic for the sound elements (these will be imported into Flash library).

Marking Scheme:

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Declaration

This dissertation is submitted in partial fulfillment of the requirements for the degree of Computer Games Design (Honours) in the University of the West of Scotland.

I declare that this dissertation embodies the results of my own work and that it has been composed by myself. Following normal academic conventions, I have made due acknowledgement to the work of others.

Name:

Signature:

Date: 25th April 2013
Programme of Study
Bsc (Hons) Computing 2012/2013

Project Title
The importance of sound design in Modern Media

Student Name
Ross Convery-B00199586

Date
25th April 2013

Supervisor
Dr. John Sutherland
Form to accompany Dissertation
To be completed in full

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<tr>
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