A study of the semiotic role of sound in interactive media

Sound: an underestimated medium in interactive design

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Introduction

From the five essay topics given for the introductory module I chose 'the semiotic relationship between sound, image and text in interactive media'. Within this area I will be mainly focusing on sound. What is the role that sound plays within interactive media to communicate, along with the other available mediums, with the end user? Sound still seems to be the most underestimated medium in interactive design. A lot of interactive media designers are not aware of what sound can do and see it as a last stage 'bolt on' medium. Sound is often just seen as an aural feedback tool or a carpet for the visuals. Bob Cotton and Richard Oliver wrote in their book *Understanding Hypermedia 2000:*

> 'Sound is a very powerful element in the media matrix, rarely fully exploited until recently' (Cotton/Oliver, 1997, p 80)

I will be using several study cases of interactive design to discuss in relation to the points raised in this essay. I chose these works because they stood out as 'better' examples of sound usage than the average work. I opted for three interactive games, a detective game called *Blade Runner* based on the film, an adventure game called *Myst 3 - Exile*, that won an award for the best musical score in game design and a game called The Sims.

I also planned to study a website and a CD ROM that both use sound in an interesting way. I did not want to study interactive designs where music was the subject area, as I want to explore how sound contributes to the design as a whole. Music as a subject would have a double role in this and confuse any analysis. However after studying numerous web sites and CD ROM's I came to the realization that maybe not many examples of interesting sound design actually exist on these mediums.

The book *Analyzing Musical Multimedia* by Nicholas Cook has been a valuable source of information. Cook describes how the different mediums work with each other to create “multimedia”. Cook uses examples in broadcast media and film. The game developers web site Gamasutra has been a source of articles written by practitioners in interactive audio design. Furthermore I have referred to various books on film and film scoring (see bibliography).

I am going to relate quite frequently to the practice of sound in film as soundtracks are very useful examples of good sound design. I felt that a lot of the theory could possibly be used for interactive media. Since about 1930 film has had a recorded soundtrack with it. Over the past 70 years film directors, film composers and foley artists[1] have developed a very sophisticated and powerful sound language.

Before going in to more detail, I would like to further specify the division, image, text and sound in interactive design into: moving images, still images, text, music, speech and sound effects. All these different mediums can be found in an interactive design and are communicating and interacting with each other.

1. Sound effect designers.

1. Sound

1.1. Sound limitations in interactive design

One of the reasons for the slow development of sound used as a medium in interactive design is the relatively large file size of digital audio files. To add sound to an interactive project involves dealing with speed problems, for example low bandwidth internet connections, slow reading CD ROM drives and game consoles that have limitations in processing speed, memory and their specific storage media.

These limitations have made designers hesitant to use sound and music to great extent in interactive works. Web and CD ROM designers have used sound sparsely with audio that has been compromised in audio quality (lower sample and bit rates or data compression techniques) to avoid these problems.

With audio compression techniques improving, faster internet connections and faster CD ROM and DVD drives these technical limitations are slowly disappearing. The arrival of game consoles like Playstation 2 has definitely set a new standard for game sound. Also surround sound is slowly becoming more popular. All this means that the use of sound in interactive media is probably going to be an important area of development in the near future. Let us have a less technical look at sound and see how it can be used, effectively to communicate with the end user.

1.2. Defining sound

To make an attempt to describe how sound communicates with the other mediums it is necessary to make a clearer definition of what sound actually is. Is all sound music? When is sound music and when is it not?

The difference between sound effects, music and speech is not always clearly defined. A certain sound played repeatedly and so creating a rhythm becomes music, even a single sound played in a certain context can become musical, a sequence of individual notes forms a musical phrase and speech, through rhythmic and tonal changes, can easily become music. However to be able to look clearly at the role of the different types of sound and the sound 'language' used in interactive media we need to make this divide, even though in reality this divide is not always that clearly delineated. As I mentioned in the introduction, sound can be split into music, speech and sound effects.

Firstly music evokes emotional reactions in people through a combination of its elements: rhythm, tempo, melody, themes, chords and instrumentation. There are many different musical styles that appeal to different people for different reasons.

Secondly speech is sound generated by the human vocal cords and is a very expressive medium. The advantage it has over written text is that it is much more defined. Cotton and Oliver wrote on the advantage of speech over text:

> "The added advantage is that we can also hear the tone of voice, intonation, pace and rhythm, which can further clarify and illuminate what is being said." (Cotton/Oliver, 1997, p 81)

Then finally sound effects, also named ambiance or environmental sounds, are sounds that give the listener a sense of being in an actual space, the listeners could imagine themselves in a different world. They provide a good way to achieve an immersing experience. Ambiance like background noises and sounds treated with varying types and degrees of reverb can make a real difference to how involved an audience is with images. They generate an inclusive space. I will refer to these sounds as *environmental* sounds from now on.

Sound in interactive design can have several obvious functions like being an aural feedback tool for the user's choices. It also acts as an attention grabber for other media, especially with visuals. There are also less obvious functions like using sound to 'talk' expressively to the user.

1.3. Sound as a language

1.3.1. Semiotics

To look at sound as a language we can make some links with semiotics. Semiotics[1] is the study of how signs communicate meanings with linguistic signs (words) being one a part of this. Ferdinand de Saussure, a Swiss academic, in his work *Course in General Linguistics*[2] describes a study of linguistic signs. Saussure claimed that this study could be applied to other types of signs that communicate meanings, like images, and study them in similar ways.

Signs, according to Saussure, consist of two parts, firstly the *signal* or *signifier* which could be the sound patterns of a word and secondly the *signification* or *signified*, which is the actual concept of a word, it's meaning. He also states that the link between these, signal and signification, is arbitrary in the sense that the word could have been any other word (e.g. table could have been the word to describe the concept of a door). In other words the sound pattern *door* has no direct connection to the concept of a piece of wood used to close a walkthrough passage in a wall. Saussure stated:

> "The psychological nature of our sound patterns becomes clear when we consider our own linguistic activity. Without moving either lips or tongue, we can talk to ourselves or recite silently a piece of verse. We grasp the

words of language as sound patterns." (Saussure, 1915, p 11)

This applies to sound as well. We can silently 'hum' a melody from a well-known song or 'imagine' what broken glass would sound like.

Another important point Saussure made was that culture and society agree on what a certain sign means Although individuals might have slightly varying understandings of signs, there seems to be a commonly agreed meaning attached to them.

1.3.2. Music as a language

If we would consider a piece of music to be a signal, used to communicate a certain message, than the concept or signification of that musical signal is not as easy to describe. The interpretation will probably vary a lot from individual to individual, much more so than with linguistic signs within a certain language[3]

For music we need to learn a new language. Music communicates in a different way. It's content is much less specific than linguistic language and yet it is a very powerful language.

Roland Barthes, a French critic describes in his book *Mythologies* that signs do

often not just *denote* a certain concept, like the door being a piece of wood used as a separation between rooms, but have other *connotative* meanings included with them. For example in a television advert; a shot of a woman driving a small car in Paris does not denote just that, but might also connote things like independence, cheekiness and confidence. These are all associative ideas formed by society and culture.

Music especially relies on these connotative meanings. The associative links within each individual, evoking emotional reactions linked to an individuals past experiences with hearing a type of music in a certain context. Film music and television have both probably become a huge provider of these connotative meanings. So very much like with linguistics, a collectively agreed language that seems to be much less specific in its description than words are. Nicholas Cook describes this when he refers to music;

> "Its ‘powers’ of transference are limited – it can convey sadness but cannot distinguish sadness from depression, despair or gloom." (Cook, 1998, p)

However music (or perhaps sound in general) has less 'language' barriers and is a more international language than linguistic language. But perhaps the best examples when sound is used to communicate meanings, becomes apparent when it is combined with other mediums like visuals or text.

1. Semeion is the Greek word for sign.
2. Lectures that were written down by colleagues and former students after his death.
3. With language here I mean a language like French or German.

2. Sound combined with visuals

How does music communicate with other mediums? Nicholas Cook writes:

> Looking at the interaction[1] and any other 'outside' medium such as words (lyrics, poetry), pictures (art installations, album covers) images (commercials, TV titles, music videos and films). As soon as we do this we are considering music as a *multimedia* – interacting with, reacting to, combining with, reinforcing, contradicting but all the time working with this other object. (Cook, 1998, p 21)

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When sound is combined with visuals the audience is practically not aware of the presence of the music (provided that it is stopped and started at appropriate moments). They simply forget that it is there and get immersed in the total experience. Sound and visuals have also the ability to transfer their specific 'qualities' onto one another. For example like classical music transferring its quality onto a title sequence of a film. Cook wrote on this:

> "By working with the image the sound seeks to explain the events, emotions and meaning, to transfer its clarity of meaning to the other. This meaning is not contained 'within' the music, in the same way as sad

> music does not ‘contain’ sadness within it. It transfers qualities of sadness into an image and onto the spectator" (Cook, 1998, p 8)

2.1. Sound in film

The way music and sound is used in film gives us a good platform for study on how sound has evolved to a medium that intelligently talks to the audience.

Sound can give a new meaning to a visual, one that is not contained within a visual image itself but through their juxtaposition.

2.1.1. Eisenstein and Montage

Another way that sound and music can work with another medium is when it is juxtaposed with for example visual images. Sergei Eisenstein in his book *The Film Sense* describes the use of montage, a way of cutting film segments that when placed in sequence and viewed suggests a new "third meaning".

> ..two film pieces of any kind, placed together, inevitably combine into a new concept, a new quality, arising out of that juxtaposition. (Eisenstein, 1986, p 14)

> ..the juxtaposition of two separate shots by splicing them together resembles not so much a simple sum of one shot plus another shot, as it does creation. It resembles a creation (rather than a sum of its parts) from the circumstance that in every such juxtaposition the result is qualitatively distinguishable from each component element viewed separately. (Eisenstein, 1986, p 17)

In this same way music, speech or environmental sounds can be images (sound images) that can be juxtaposed against images from the other available mediums. Eisenstein actually touches on this briefly in *The Film Sense* when he describes Maupassant's *Bel Ami*.[3] Where there are aural images of church bells used to juxtapose against film shots to evoke associations[2] about the concept of the midnight hour.

2.1.2. Diegetic and non-diegetic sound

Another film concept I would like to 'borrow' for interactive media is the use of diegetic and non-diegetic content. James Monaco in his book: *How to read a film* refers to these as *actual* sound and *commentative* sound. Karl Reisz, a director and theorist named these *synchronous* and *asynchronous* sounds. They all describe the same concept.

Sound that is part of the world in which the characters live in a film is called *diegetic* sound. This could be dialogue, music played by a band that the film character happens to watch in a club or environmental sounds like rain or a passing car.

Non-diegetic sound is sound that is alien to the world of the characters in a film plot. It could be a voice-over commenting on the story or music that is not part of the world described in the film, that comments on the scene or following scenes.

In interactive media examples of non-diegetic content could be background music, as seen in many games or the sounds used on the controls of a settings menu etc. Even though diegetic and non-diegetic sound is already being used in interactive design, it would be good that designers start realizing the difference between the two. For example making use of non-diegetic music to explain something or to comment on the emotional state of an interactive character. It could be information that is solely introduced by the music as opposed to visuals. Like music suggesting a character is thinking of something completely unrelated to what is seen on the screen or sound predicting the arrival of something unsettling about to come into the scene of a game.

Jack Hall, music composer of the Myst 3 - Exile game states in the video *the making of the music* about music being "the unseen character"[4]

"Music is the unseen character, in any media form it does become something that the listener may not really be thinking about, but yet affects their perception of what is actually happening on screen, whether that is a computer screen, television screen or a film screen."

So non-diegetic music comments on whatever is visible on screen, a third observer making comments to you as an audience in an almost completely subliminal way. The music in myst 3 makes use of this, for example when you get closer to the evil character in the game, the music gives you a preview of his presence.

2.1.3. Other uses of sound in film

There are many different applications for sound (especially music) in film. For example it can provide emotional or dramatic impact, create anticipation or it can set a certain mood or atmosphere. Music is also used to make sense out of sets of disparate images, rather like glue or it can highlight events that need accentuating.

1. Interaction between the different media, e.g. sound and visuals. Not interaction of the end user in interactive works
2. Like Barthes' connotations
3. Sergei Eisenstein - *The Film Sense*, page 25
4. Filmed interview available from Myst III - Exile Website: www.myst3.com

3. Sound in interactive environments

Why then do we not just use sound design practice from film. Unfortunately it is not as simple as that, because film is a very different medium. It is a linear medium, as in that the user experiences it exactly in the timing and order of events that the author intended to. Film music can be perfectly adjusted to the events on screen as the timing is given. Interactive design however has a temporal issue in that the user, as opposed to the author, decides on changing or 'cutting' to a new scene[1]

For environmental sounds this problem is fairly easy to solve in an interactive environment. Incidental sounds are often short in nature and 'constant' environmental sounds can be faded in or out. The main problem is with music.

3.1. Adaptive music

In an interactive scene it is impossible to predict when the user is going to make a change. In many interactive designs music is just used as a constant background. If music is used to communicate a message to the user it could involve changing the mood, pace or impact of the music. When a piece of music starts and the user makes a fairly quick change, there is a good change that a musical theme or

melody is cut short in order to make way for another piece of music that relates to the new scene. If this happens frequently music will lose its 'hidden powers' and become rather annoying. However if a user decides to remain at the same position for a while, the music has to be able to keep interest.

This means that we need to find a new way to look at music. We cannot just use 'linear' music as we know it but have to find a way to 'blend one piece of music into another or make it *recompose* itself. On the website Gamasutra, a game developers site, there are a number of composers describing various practical solutions to these problems. (See websites)

One of the solutions by game sound designer Donald Griffin[2] describes a method of having several parallel streams of music in different moods. These are then themselves divided into chunks that make musical sense (e.g. several bars), so that if the user changes one could jump to a different mood after finishing a chunk.

Another method can be music that re-composes itself into a different piece, by gradually introducing elements of the second piece into the first whilst removing elements of the first piece. These elements could be the individually recorded instruments. For example introducing a more orchestral type of sound like a cello or violin into a modern beat with synthesized sounds. The transition would be gradually and could change a piece into a totally different mood.

3.2. Sound in interactive games

3.2.1. Blade Runner

Blade Runner is a detective game, where you control the main character's actions to solve a crime. There are various locations one can travel to, like china town in figure 01, and the amount of locations increases as you find out more.

Figure 01

During the title sequence there are some interesting computer noises synced to visuals events. Following the opening there is a non-interactive back-story that features some mysterious sounds and a mixture of diegetic and non-diegetic speech.

The environmental sounds in this game are the most effective part of the sound design. They are immersing and there are different ambiances depending on where the main character is. For example there is rain, futuristic city noises and wind audible in all the outside scenes, but the balance between them changes depending on the location.

There are a few interesting uses of speech. There is the ability to reply to other characters in the game in different ways. The conversation modes a player can choose are: *polite, normal, surly* and *erratic*. A computer interface gives the player access to, on purpose, degraded audio recordings of past events and recorded statements providing clues for the investigation.

In the calmer scenes there is occasionally some non-diegetic jazzy music, which is triggered at certain locations. This music keeps on playing when returning to the previous scene, rather than abruptly being stopped.

The environmental sounds are very immersing and the use of speech has some interesting ideas, but the use of music was slightly disappointing. Especially taking into consideration that the game is based on the film Blade Runner that has an excellent music score.

3.2.2. Myst - Exile

This game won an award for the best musical score in interactive game design. American composer Jack Wall composed the music. The use of a decent music score is immediately apparent from the title sequence of the game. The music is very film like, epic music, giving the images a profound status.

It is ethnic sounding (Arabic and mysterious) and features a big chanting chorus.

Figure 02

The sound quality is superb on this game and the visuals are very realistic (see figure 02). In the opening scene there is a 360-degree panoramic view and Atrus' wife Catherine starts talking to you. During her monologue, telling you to wait in the study for Atrus, you can still change your panorama by mouse action (figure 03). Cathrine's voice pans around with that view in the stereo image, relating to where

you are faced. A good example of sound used relating to the perspective view. There is an appropriate room ambiance (added reverb) on her voice.

Figure 03

The game uses a lot of short music phrases (often of ethnic nature) sometimes very close sounding and sometimes distant. These changes in volume make the 'soundtrack'[3] very dynamic and prevent listeners getting bored.

On every position in the game you have the same 360-degree panorama and visuals are very immersing on their own. However they really come alive through the use of very convincing environmental sound. On the various Islands in the game there are sea and wind noises. The level of this sea noise changes

depending on where you are on the island and disappears completely once you are inside the various houses.

There is use of non-diegetic music throughout the game, depending on your position. After passing the same location a few times they do become slightly repetitive (e.g. location in Figure 04). Especially in interactive design there is the opportunity to avoid these issues to give the user a different experience every time.

Figure 04

The music overall is comparable in quality to a very decent film score, which is a good to see in interactive design. The music is very successful in building tension and creating unsettling and mystifying atmospheres. The tempo of the music is constant and slow (apart from the opening titles), which suits the pace of the game.

This means the game is quite forgiving to interactive changes. It would be interesting to see how a fast paced game with a similar fully orchestrated score deals with interactive change.

3.2.3. The Sims

The Sims is a game where you have to control the lives of a family that you have created yourself (see Figure 05). You can control the characters by selecting them and giving them orders around the house.

Figure 05

The game Sims uses a lot of diegetic environmental sound that is often witty and reasonably realistic. The speech of the characters is recognizable as being speech but is made incomprehensible. It sounds like people talking in a different language and gives the game international appeal.

The appliances in their houses (figure 06) often make appropriate noises, for example when the television is switched on it does a realistic impression of television sound, a combination of music, speech and TV idents.

Figure 06

Whilst playing the game there was one occasion where the sound suddenly changed and some 'scary' non-diegetic sound / music was introduced as a green ghost walked through the wall of the house and back out again.

There is also use of non-diegetic sound for example when the user switches from *Live* mode (diegetic mode) to *Buy* or *Build* mode where you as a user can do building work on the house or buy household items for the characters to use. In these modes there is music. In Buy mode there is some music that has an

association of being in an American department store in the fifties. On build mode there is some calming piano music. Furthermore there are various navigational feedback sounds.

Although the environmental sound and the music in this game is tastefully selected, I feel that sound could have played a much bigger role in things like commenting on the emotional state of one the characters. In the game this is done mainly visually.

3.3. Sound on the Internet

After browsing for weeks on the web for the 'better' websites using audio, it proved really hard to find anything useful to analyze. The sites that have good use of sound are sites that depend on another medium like sites featuring film or music. Film sites rely heavily on their film score. Some of these sites feature tasteful non-interactive opening and transition sequences with synchronized sound and navigation sounds, but there is not much more to it. Various websites relating to music have good use of sound; there are for example remix websites where you can remix an artist's music online. But the role that music and sound have here is one where the user is very aware of its presence and sound is not being used in constructing meaning. There are also many company websites, often programmed in Flash with modern design that feature a few good navigational feedback sound

with some *trendy* music thrown in. None of these sites use sound as a tool to communicate to the viewer other than the message: 'we are trendy'.

1. With scene here I mean an interactive node.
2. http://www.gamasutra.com/features/sound_and_music/19980501/interactivity_techniques_01.htm
3. The mix of music, speech and environmental sounds.

Conclusion

Music and sound still have quite a bit of maturing to do in interactive design, but these are very interesting times, with technologies improving and game designers finally starting to acknowledge the need of decent music scores.

To improve sound design in interactive media, one needs to be aware of what sound can do and start viewing it as a medium that has huge potential to communicate messages to the end user. It participates, in a 'hidden' way, in constructing meanings in interactive works through; juxtaposing sound images against other media, the use of non-diegetic sound to comment on visual events and the powerful immersing qualities of environmental sounds. These are tools that are rarely used to their maximum potential.

The study examples that I have used were partly successful in some of these areas. It will be interesting to witness how the other areas of interactive design are going to develop and how they can use sound to enhance their user experience. Potentially areas of interest might be interactive fiction and 'living books'. Combining the exactness of the written word with the different aspects of ‘the language of sound’ in order to tell a story.

Interactive design on the Internet seems desperately in need of sound content. Web pages with no or little sound can often feel very ‘distant’ and remind me of watching an old silent film.

There are some people scratching their heads and trying out solutions to tackle the problem with sound and interactive change. Music composers involved in interactive design need to review their traditional approaches to composing music in a linear way, and learn to compose for interactivity. This could possibly even lead to new forms of music.

There are also advantages in using sound for interactive media over that of film. Sound and music can adapt and change when encountering a previous visited scene to avoid repetitiveness. It could be always a new and different experience and it can also give the user a feeling of being in control.

A very interesting area for me, as a sound designer for visuals, is interactive film scoring and sound design. How to make adaptive music work to an acceptable standard and see where it can be implemented into interactive design? Producing an interactive film with an adaptive music score seems like a challenge worth exploring.

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Real World *Ceremony of innocence*

Real World *Xplora 1*