

● Conceptualizing Emotional Effects of Sound in Games

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● Introduction

The importance of sound for establishing mood in audiovisual media is well recognized. It should come as no surprise that viewing a movie without sound can strip it of its emotional impact, making the events pictured on screen seemingly distant and of little relevance. The potency of sound is also rather well exploited at least in contemporary gaming. The model for sound design in these games is often that of film sound; game sounds should be “Cinematic” (Bridgett 2007) or “Bigger than life” (Prince 1996).

However, it is a well known fact that games differ from film. Not surprisingly, also sound design in games is different from film sound on several points. Without further deviating to a comparison between film and games, it suffices to mention some of the challenges game sound has to conform to. Whereas film sound is written to a fixed set of actions with known durations, seen through predefined points of view, game sounds must span action sequences of undefined temporal duration and suit alternative paths and viewpoints to the story. Most games ask players to perform similar actions again and again; hence, sounds must survive high repetitiveness. Preferably, all this is done while maintaining the narrative and emotional functions of sound.

The selection of sounds for games is obviously a challenging task. Surprisingly little academic investigations into sound have addressed this issue. Also, while there are many books on game sound design, the majority of literature deals either with the technological tools for creating the sounds or managing the overall process of sound design (e.g. Brandon 2005, Sanger 2003). The best foundations for game sound design decisions can be found in the fragmental accounts written by designers (e.g. Prince 1996, Bridgett 2007, Kutay 2006), sharing glimpses of their intuition and experience in the craft through audio post mortems and project descriptions.

● Theories of emotion in sound design

Underlying design decisions of conventional practices of sound design for both cinema and game is an implicit understanding of what kind of sounds and actions create emotional impact. Psychology provides tools for explicating these relations, addressing both why and how sound works to create emotion. The work presented here aims at an illustration of how psychology of emotion lends tools to understand and predict the impact of sound design. The purpose is twofold. First is an attempt to serve the academic discussion on sound design, by reviewing and synthesizing relevant literature from fragments of information to be found in several different fields. Second, my hope is that an understanding of the underlying processes of sound will provide useful concepts for practical work, by bringing to light the alternative possibilities and approaches for impacting the player experience.

○ Emotional reactions to film

Emotional relations to film and games is an example of emotional relation to fictional events. This has been a very controversial subject, and arguments go back and forth about whether all these emotional reactions, which have their cause in completely fictive events, are even real emotions at all. There are two dominant approaches to understanding how film elicits emotional responses, none of which deals explicitly with sound. One approach is based on Freudian psychoanalysis, invoking as a key concept the Lacanian *mirror stage*, which “typifies an essential libidinal relationship with the body-image” (Lacan 1951). This stage is called forth by identifying in film, a process that links the self with the film experience through subconscious mental responses (the basis of which is rooted in early childhood and formations of the *Ego*).

An alternative approach explains the emotional reaction to film through cognitive appraisal of portrayed fictional events. Instead of identifying subconsciously, the viewer responds emotionally because of their cognitive investment in the fictional events. The viewers' emotional responses are related to motivational processes (Frijda 1984, Tan 1994, Lazarus 1991).

The mechanism by which Tan (1994) suggest the film viewer connects to the fiction is through a witness position. This position of agreed-upon inaction (even in the most anxious of moments, we are content to just watch the film) dictates the relations between viewer and film events. Our commitment to the protagonist's cause gives rise to emphatic relations. However, the inactivity dictated by the viewing position also creates tensions, such as worry or frustration when we know more than the protagonist, but cannot change the situation. On the other hand, inactivity may allow us

to more deeply empathize, since no action is asked of us.

Tan (1994) bases the validity of his model on Frijda's (1986) theory of emotions and discusses in length the compatibility of his theory with Frijda's basic tenets. In short, he argues that emotional responses can arise to fictive events as long as they are perceived as apparent reality. This is achieved mainly by *the diegetic effect*, a cognitive and perceptual illusion in the viewer's head. The illusion is maintained with several cinematic techniques, usually by dissolving and eradicating the medium. The witness position, Tan argues, is one of the very means in which the cinema excuses the viewers' passivity and explains, in keeping with the diegetic effect, the viewers' ability to see it all.

Another way to look at emotions is to allow emotional responses not only to real events, but to the fictions of our imagination. Damasio calls the latter type *as-if emotions* (Damasio 1994 (2005)), and describes in detail the processes in which the mind simulates affective responses. According to Damasio, fundamentally affective processes are part of all rational decisionmaking, and function as a means of making decisions – we reason by simulations on how the outcome might feel. From this point of view, film viewing would be just another way of running simulations.

○ Cognitive views on sound and emotion

The appraisal theory of film emotion would seem to give little explicit explanation of how sound contributes to emotion. However, it seems clear that sound is part of the filmic processes that make the events seem real and consequential for the viewer, both factors mentioned as prerequisite to genuine emotional experience (Tan 1994). Moreover, in discussing the effect of sentiment, Tan and Frijda (1999, 62) mention sound as one possible source for the awe-inspiring. This is one of the main themes wherein film causes a sense of overwhelming power and causes viewer submission - the emotion underlying crying. Finally, music is clearly related to what Tan (1994) identifies as non-empathic emotion, which is an affective judgement related to the film as artefact. Whereas empathic emotions require cognitive investment, some understanding and relating to the events and characters in the film, non-empathic emotions require no appreciation of events. They are linked to sensory pleasures – the viewer enjoys the good looks of the protagonist or the beautiful scenery. Film soundtrack CD sales give strong evidence that these functions work with regards to the musical score as well. Beautiful pieces of music obviously give themselves to being appreciated as such, disregarding of whether the viewer is attending to the story. Interestingly, Tan does not explicitly mention negative affect in this context. With thought to how visual material is used for shock effects (e.g. displaying blood and entrails), it is nevertheless easy to imagine a similar process in which unpleasant sounds, regardless of story, could produce negative affect.

○ Unconscious affective processes

Appraisal theory of emotion considers affect by means of perceived *experience*. This view holds that emotional processing and value judgement is always conscious. Nevertheless, there seems many of the associations and effects of sound in both film and games are working on an unconscious level.

Several findings state to the fact that at least some evaluations of stimuli are made precognitively. Zajonc (1980) was among the first to point this out in his essay, famously entitled “Feeling and Thinking: Preferences need no Inferences”. This view is further fortified by subsequent results from experimental psychology, leading researchers to suggest that there exists such a thing as unconscious emotion (Winkielman and Berridge 2004). For example, Öhman (2005) has demonstrated fear reactions in people who were presented with spider and snake pictures subconsciously; that is, people became frightened of pictures they never even realized they had seen.

In light of unconscious value judgements, it is easy to read Tan's non-empathic emotions are but one example of these: the sounds of the film are invoking emotion by nature of their perceptual properties, unrelated to story at hand. This also opens up a way to understand and predict what would result in a positive (or negative, for that matter) value judgement. One especially interesting approach is Reber, Schwartz and Winkielman's (2004) discussion on the importance of familiarity and perceptual fluency for eliciting positive value judgements. By this account, beauty is defined by the ease in which a stimulus can be processed.

○ Misattribution and making sense of emotions

Affective responses bring include a paraphenalia of bodily responses (pounding heart, sweaty palms) and may also bring with them a certain action tendency (e.g. fight-or-flight). In fact, it has been suggested that one possible function in which we do consciously attend to our affective processes is by appreciation of the abrupt changes in the felt background state, or what Russell (2003) has called *core affect*. This change would lead us seeking for a cause of our altered state, leading us via cognitive process to attribute the jolt to the most plausible event in our environment.

Whether or not we are willing to accept unconscious affect as the source of *emotions*, when consciously attended to,

tend to have an object. Emotions are thus episodic reactions *to something*, and by definition, we must be able to determine an object, something to be afraid or pleased *of*. This distinguishes emotion from moods, which are long-term affective states without an object. However, and here comes the catch, the events we cognitively allocate as objects do not necessarily have to be the true cause of our initial affective response. In fact, when it comes to reasoning why we feel like we do, we are prone to make mis-attributions and erroneously appreciate our affects quite differently from their real causes even in real life.

A classical example of misattribution is a study by Schachter & Singer (1962). They injected subjects with doses of adrenaline, a hormone associated with an excited body state. Depending on the situation that followed the injection, subjects judged their aroused state as either anger or elation. It can be argued that in most cases, our appreciation of our emotional state is at least partly determined by context.

Now consider a similar contextual appraisal at work in film, with music, sounds, pictures and plot intricacies all mingling to create emotional impacts. Is it not probable, that at some point, the true causes of our feelings might remain oblivious to us? Is it not possible, that we, stirred by our passions blindly accept objects of emotion from the fiction before us, served to us on a silver plate?

● **Designing emotional sound**

The understanding of emotion indicated that sound may function in film by **invoking sensations of apparent reality**, allowing viewers (and listeners) to appreciate the events of the film as if they were actually happening. While attending to events, temporal congruence of picture and sound will guide perception and attention so that only events of relevance are attended to, while other events remain in the background (and no notice is paid to the fact that there is a symphony orchestra playing in the desert). As part of the evaluations will remain in the background, **sound influences emotions by unconscious value judgements**, that are misattributed to events in the film.

One of the main tasks of sound designers is thus to make the events on screen seem real. At the same time it is possible to benefit from unconscious affective processing to imbue events with emotional character. The sense of realism is highly dependent on sound, as sound gives two-dimensional events on screen physical significance – it defines the mass of colliding bodies or the force of wind and binds events into a plausible environment.

The function of the unconscious is most apparent in two conventions in sound would seem to deviate from the purpose of reality. In what seems like a blatant contradiction, they invoke a sense of realism in highly unrealistic sounds: One is the use of musical scoring. The other is the use of Foley and sound effects that go beyond what is seen on screen. The emotional processes of music have perhaps received most attention of all investigations of sound. I will here limit my discussion to how they apply to film and games. Similar discussions on Foley and sound effects, on the other hand, are yet lacking.

○ **Music**

Annabel Cohen (1990, 2001) has dealt extensively with the difficult question why, and how, something as obviously constructed as the film score, does not completely destroy the sense of realism in a film. On the contrary, as many composers will confirm, a carefully chosen (or composed) piece of music will actually heighten the sense of reality in a film. Music also seems to lend a great deal of emotion to events, in ways other than proposed by Tan. Cohen's answer lies in a congruence-association model of film viewing (Marshall and Cohen 1988), whereby music focuses attention on those objects in the film that are congruent with the sound. At the same time, the conscious attention is directed away from non-associated sounds, and attending suppressed for stimuli irrelevant for ongoing cognitive processes.

The emotional impact in Cohen's account comes from the fact that sounds, even when unattended to, will nevertheless affect perception of objects in the film. Cohen (2001) highlights the importance of temporal unity as a binding factor and predictor of which parts of the sound will draw attention. She calls our attention to animation and the technique called mickey-mousing, whereby sound effects are replaced by short musical motifs. Their temporal matching allows these music snippets to replace the original sounds of the events, at the same imbuing both the events, and the objects part of the action, with specific characteristics.

Musical techniques for creating emotion are rather well understood. Krumshansl (2002) describes musical emotion in terms of fulfilling expectations: the interplay between anticipated and sounded music progression create patterns of dynamic tension and relaxation. Several sources of expectations exist, and while some are culturally founded, at least part of the functions of musical meaning appear to be universal (Narmour 1990).

The critical requirement for musical expectations to arise is that it is attended to as music. Notably, musical listening, in which sounds are perceived as sounds, is not the only form of attending to events. An illustrative deviation from this frame are listening styles provoked by compositional techniques invoking other listening styles, like *musique concrète*,

where the use of real world sounds provokes listening, not at sounds and patterns, but for causes – Chion aptly refers to this as *causal listening* (1994). This is a special case of music, perhaps seldom used in film, but appearing more and more in games.

○ **Foley and sound effects**

The Foley artist is the person responsible for creating these sounds of on-screen events. He will pour sand on paper, smash pumpkins and bang doors and cutlery in order to reproduce sounds that fit with a certain event. Many times, the sounds produced have little to do with the actual event seen on the film screen – indeed, often nonrealistic sounds are purposefully used to make the action sound better. It is, for example, recognized that walking on cornstarch sounds much 'more real' on film than the actual sounds of walking on snow. The realism is thus not in faithful reproduction of sounds, but to choose the most *representative sounds* of a certain action.

A possible explanation underlying the perceived realism of Foley sounds is the notion of prototypicality. A prototype is an object that inhabits central perceptual characteristics of a given category. Prototypes do not necessarily exist in reality, they are mental constructs of our perceptual system. The prototypical chair is the average of all chair perceptions of your brain, and by definition, it will be the 'chairest' chair of them all. Experimental psychology has established that people perceive prototypes as more easily recognized (Konijn 1994 according to Tan 1994), more beautiful, and trustworthy (Reber, Schwarz and Winkielman 2004) than other category members. The reality effect of Foley may work by means of this same effect.

○ **Applying the theory of emotional sound to games**

The investigation of emotions in film points to two sources of emotional impact. The cognitive appraisal is directed by evaluations and conscious appreciation of narrative situation. This model has also been invoked in relation to computer games. It lends itself rather well to this purpose. The interactive nature of games, with players controlling the main character, makes the cognitive investment – the care for the protagonist – quite apparent and an appealing way of explaining emotions in games. Lankoski (2007) offers an example of how the cognitive appraisal in a gaming context, relating emotionality to the cognitive appraisal of progress within the game's goal structure and demonstrating, how different game functions spur basic emotions.

However, whereas cognitive appraisal of game events lends itself to an emotional impact, a key question in games is how the narrative reality is maintained. Especially, games remove the passive viewing position, which Tan (1994) suggested is the main contributor of empathic effect in film. Also, the typical structure of games – featuring repetitive action, often only loosely bound together with thin narrative strings – is challenging to creation of emotion.

A possible solution to shift focus from music to the emotional impacts of Foley and sound effects. Even now, most attempts of creating emotion goes via music - this is also evident in how much effort has been put into scoring games, despite the challenges of nonlinearity brought by interactivity. A possible avenue for emotionality in games is in environmental sounds, which is already used in some games, for example *Silent Hill 2* and *3* (Konami), where ambient merges with musically suggestive elements and event sounds. For this shift to happen, there is need for a better understanding of how everyday sounds influence emotions. Especially called for in this case are investigations into structural and representation features influencing sound emotion. In these investigations, theories of unconscious emotion may prove especially informative.

● **Emotional sounds in survival horror**

My research considers sound in games generally, but special attention is given to the genre of survival horror games. Horror is especially interesting for an investigation into game sound: First of all, horror films usually deviate from traditional classical Hollywood cinematic structure (see e.g. Bordwell, Staiger & Thompson 1985), as narrative gives way to repetitive and only loosely causal sequences of repeated struggles with monsters. This structure, which makes them more reminiscent of games than other forms of filmic display, seems a fruitful point for takeoff into the investigation of film sound techniques in gaming context. Second, horror films rely on an interesting selection of emotional impact – ranging from visceral feelings of disgust to ecstasy, loathing to sympathy, suspense and fear to relief. Few are the genres that encompass such a rich emotional variety. Third, the genre of horror seems all but dominated by sound. Early on, before the availability of convincing computer graphics, sound was often utilized to mask and hide technical limitations - or replacing it completely - as with the famous mechanical shark, which failed to function properly during filming of *Jaws*. Indeed, Whittington (2007) mentions sound as one of the main tools for maintaining narrative cohesion in horror films, citing film composer Hans Salter on how music was used in these B pictures “to create the the tension that was otherwise not there on the screen”. (Whittington 2007, 131)

Fundamental to the survival horror genre is that the player engaged with the player character. Horror games use sounds

in several ways to support the emotional impact. Like in film, game sounds are crucial in building a credible game environment. Fundamental to engagement are also music and environmental ambience. The interactive nature of soundscapes endows the game environment with a certain degree of anthropomorphism. Together with highly emotive music this evokes fear in the player. Contrary to fear due purely to compromised goals, the emotions evoked by sound are not detached. Playing on basic emotional responses, horror game sounds invite players to feel real fear, while the other (visual and tactile) components preserve the safe boundary between fiction and real. Point of audition sound further invites the player into this subjective position. Synchronised sound effects are an extension of touch, allowing for visceral experiences of the player character's actions. The role of sound effects for providing information in game can also intensify fear. Multilayered, ambiguous sound requires the player to make an effort to understand, decode, locate and make sense of sounds. Finally human sounds like screams and sounds of the body (e.g. bones breaking) are used to invoke visceral experiences of disgust as the player imagines unpleasant body interactions or pain.

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