

## Chapter 67

# Auditory Experiences in Game Transfer Phenomena: An Empirical Self-Report Study

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### ABSTRACT

*This study investigated gamers' auditory experiences as after effects of playing. This was done by classifying, quantifying, and analysing 192 experiences from 155 gamers collected from online videogame forums. The gamers' experiences were classified as: (i) involuntary auditory imagery (e.g., hearing the music, sounds or voices from the game), (ii) inner speech (e.g., completing phrases in the mind), (iii) auditory misperceptions (e.g., confusing real life sounds with videogame sounds), and (iv) multisensorial auditory experiences (e.g., hearing music while involuntary moving the fingers). Gamers heard auditory cues from the game in their heads, in their ears, but also coming from external sources. Occasionally, the vividness of the sound evoked thoughts and emotions that resulted in behaviours and copying strategies. The psychosocial implications of the gamers' auditory experiences are discussed. This study contributes to the understanding of the effects of auditory features in videogames, and to the phenomenology of non-volitional auditory experiences.*

### INTRODUCTION

Modern videogames are rich in sensory cues. Auditory effects are crucial for enhancing the playing experience by increasing the awareness of surroundings, capturing the attention, and eliciting emotions in combination to visual cues (Nacke, Grimshaw, & Lindley, 2010). Auditory cues in

videogames include theme songs, background sounds, and ambient sounds, spoken narrations and dialogue, and even spectral silence. Furthermore, sounds are used as rewards, punishment, and as feedback in response to gamer actions. The psychological and physiological effects of auditory stimuli and music are well known (Polkosky & Lewis, 2002). In fact, music is one of the most

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effective ways to induce mood in experimental psychology studies (Kenealy, 1988). A considerable amount of literature has been published on the effects of music (Blood & Zatorre, 2001), as well as the phenomenology of re-experiencing auditory cues in an absence of auditory stimuli in clinical and non-clinical populations (Hyman et al., 2012; Liikkanen, 2012). However, only a few studies have focused on exploring the effects of videogames' auditory cues on gamers during playing (Hebert, Beland, Dionne-Fournelle, Crete, & Lupien, 2005).

In virtual environments, sounds, visual cues, and viewer perspective (e.g., first person, third person) have all been reported to affect presence in the game (Anderson & Casey, 1997; Hendrix & Barfield, 1995). Better simulation of multiple senses results in an increased feeling of presence and immersion (Anderson & Casey, 1997). Furthermore, sensory input can boost memory of objects in the virtual environment (Dinh, Walker, Hodges, Song, & Kobayashi, 1999). Västfjäll (2003) found that emotional reactions to auditory events in the virtual environment were moderated according to the audio channels (mono, stereo, and six-channel reproduction). Stereo and six-channel reproductions were found to be strongly correlated with changes in emotional reactions when compared to the mono condition. Additionally, six-channel reproductions showed the highest ratings of presence and emotional realism.

Hebert, et al. (2005) examined the effect in cortisol secretion triggered by techno music in a violent videogame. They found that the group who played with music showed significantly higher cortisol levels, which suggested the importance of music in inducing stress by playing the game. Eui Jun, Bohil and Biocca (2011) conducted an experiment with violent videogames where the colour of blood (red versus blue) and realistic screams of pain (on versus off) were manipulated. The results showed that realistic blood colour and screams resulted in higher physiological arousal. Similarly, Lauter, Mathukutty, and Scott (2009)

investigated the effects on the nervous system of erratic breathing sounds heard in some videogames while the character is frightened, wounded and running. Their experiment showed that hearing erratic breathing (compared to quiet breathing) affected the human nervous system. According to the researchers, these findings together with studies that show that videogame playing provoke arousal (Hebert, et al., 2005) support the fact that anxiety and panic can be elicited by playing videogames.

To our knowledge, the current study is the first to examine hearing re-plays of auditory cues from videogames after stopping playing. The aim of this study was to investigate gamers' auditory experiences (e.g., hearing music, sound effects, or characters' voices) that occurred directly after stopping playing or sometime after stopping playing via the triggering of automatic associations. This was done by identifying, classifying, quantifying, and analysing gamers' auditory experiences. These experiences will be referred to as Game Transfer Phenomena manifesting auditorily (GTP-AUD) and contributes to the understanding of the effects of auditory features in videogames, and the phenomenology of non-volitional experiences (e.g., involuntary auditory imagery, semantic memories, and hallucinations).

## **METHOD**

### **Participants**

A total of 2,000 gamers' experiences identified as GTP in one or more modalities (e.g., visual, auditory) were collected from 60 online videogame forums over a seven-month period. (Online videogame forums include comments to articles on websites, since these are considered discussion platforms). This resulted in 192 auditory experiences from 155 gamers collected from 31 different online forums. Only 37 gamers reported their age (ranging from 14 to 30 years;  $M = 20.03$

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