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Game Transfer Phenomena in Video Game Playing: A Qualitative Interview Study

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Abstract

Video game playing is a popular activity and its enjoyment among frequent players has been associated with absorption and immersion experiences. This paper examines how immersion in the video game environment can influence the player during the game and afterwards (including fantasies, thoughts, and actions). This is what we describe as Game Transfer Phenomena (GTP). GTP occurs when video game elements are associated with real life elements triggering subsequent thoughts, sensations and/or player actions. To investigate this further, a total of 42 frequent video game players aged between 15 and 21 years old were interviewed. Thematic analysis showed that many players experienced GTP, where players appeared to integrate elements of video game playing into their real lives. These GTP were then classified as either intentional or automatic experiences. Results also showed that players used video games for interacting with others as a form of amusement, modeling or mimicking video game content, and daydreaming about video games. Furthermore, the findings demonstrate how video games sometimes triggered intrusive thoughts, sensations, impulses, reflexes, optical illusions, and dissociations.

Keywords: Video games; video game playing; computer games; game transfer phenomena; dissociation.

Introduction

Video game playing is a popular leisure activity that has been the subject of an increasing amount of empirical research. This research has highlighted both the positive and potentially negative effects (e.g. Greenfield, DeWinstanley, Kilpatrick & Kaye, 1994; Feng, Spence, & Pratt, 2007; Dill, 2009). The more positive benefits of video games include the fact that they can be educational (e.g., deFreitas & Griffiths, 2007; Griffiths, 2010), socially stimulating (e.g., Cole & Griffiths, 2007; Hussain & Griffiths, 2007) and/or therapeutic (e.g., Griffiths, 2005). The more negative effects of video games are the claims that they can lead to increased aggression (Anderson, Gentile & Buckley, 2007) and be addictive (e.g., Griffiths, 2000; 2008), especially online videogame playing where the game never ends and has the potential to be a 24/7 activity (e.g., Ng & Weimer-Hastings, 2005; Chappell, Eatough, Davies & Griffiths, 2006; Grüsser, Thalemann & Griffiths, 2007).

Today's video games have evolved due to technological advance, resulting in high levels of realism and emotional design that include diversity, experimentation, and (perhaps in some cases) sensory overload. Furthermore, video games have been considered as fantasy triggers because they offer 'what if' scenarios (Baranowski, Buday, Thompson & Baranowski, 2008). What if the player could become someone else? What if the player could inhabit an improbable world? What if the player could interact with fantasy characters or situations (Woolley, 1995)? Entertainment media content can be very effective in capturing the minds and eliciting emotions in the individual. Research about novels, films, fairy tales and television programs has shown that entertainment can generate emotions such as joy, awe, compassion, fear and anger (Oatley, 1999; Tan 1996; Valkenburg Cantor, & Peeters, 2000 cited in Jansz, et al, 2005). Video games also have the capacity to generate such emotions and have the capacity for players to become both immersed in, and dissociated from, the video game.

Dissociation and immersion: It is clear that dissociation is a somewhat "fuzzy" concept as there is no clear accepted definition of what it actually constitutes (Griffiths, Wood, Parke & Parke, 2006). Most would agree that dissociation is a form of altered state of consciousness. However, dissociative behaviours lie on a continuum and range from individuals losing track of time, feeling like they are someone else, blacking out, not recalling how they got somewhere or what they did, and being in a trance like state (Griffiths, et al, 2006). Studies have found that dissociation is related to an extensive involvement in fantasizing, and daydreaming (Giesbrecht,

Geraerts & Merckelbach, 2007). Dissociative phenomena of the non-pathological type include absorption and imaginative involvement (Griffiths, et al, 2006) and are psychological phenomena that can occur during video game playing. Anyone can, to some degree, experience dissociative states in their daily lives (Giesbrecht et al., 2007). Furthermore, these states can happen episodically and can be situationally triggered (Griffiths, et al, 2006).

When people become engaged in games they may experience psychological absorption. More commonly known as 'immersion', this refers to when individual logical integration of thoughts, feelings and experiences is suspended (Funk, Chan, Brouwer & Curtiss, 2006; Wood, Griffiths & Parke, 2007). This can incur an altered state of consciousness such as altered time perception and change in degree of control over cognitive functioning (Griffiths et al, 2006). Video game enjoyment has been associated with absorption and immersion experiences (IJsselsteijn, Kort, de, Poels, Jurgelionis, & Belotti, 2007). How an individual can get immersed in video games has been explained by the phenomenon of 'flow' (Csikszentmihalyi, 1988). Flow refers to the optimum experience a person achieves when performing an activity (e.g., video game playing) and may be induced, in part, by the structural characteristics of the activity itself. Structural characteristics of video games (i.e., the game elements that are incorporated into the game by the games designers) are usually based on a balance between skill and challenge (Wood et al, 2004; King, Delfabbro & Griffiths, 2010), and help make playing video games an intrinsically rewarding activity (Csikszentmihalyi, 1988; King, et al. 2010).

Studying video game playing: Studying the effects of video game playing requires taking in consideration four independent dimensions suggested by Gentile and Stone (2005); amount, content, form, and mechanism. The *amount* is understood as the time spent playing and gaming habits. *Content* refers to the message and topic delivered by the video game. *Form* focuses on the types of activity necessary to perform in the video game. The *mechanism* refers to the input-output devices used, which means what interfaces are used for interacting with the game (Gentile & Stone, 2005). Players' experiences are understood as cognitions, emotions and sensations experienced by the players. In addition to player actions, the term *engagement* is used as an indicator of game involvement and includes three different types of engagement: behavioural, emotional and perceptual engagement (Ortiz, 2007). More specifically:

- *Behavioral Engagement* refers to repetitive patterns of behavior over a period of time, and where the frequency, quantity and duration of such behavior become habitual.

- *Emotional Engagement* refers to the personal investment and active participation that may provoke varying levels of physiological arousal impacting cognition that in turn may alter the individual's affective state and mood states.
- *Perceptual Engagement* refers to the interplay between an environment that provides stimuli to the individual, and the individual's capacity for getting involved giving place to dissociative experiences (e.g. telepresence, losing sense of time, etc.).

In gaming, engagement has, for instance, been documented in players' *response cries* in the form of spontaneous verbal outbursts (Aarsand & Aronsson, 2009; Goffman, 1981), as well as in players' talking back to game characters as if they were alive (Aarsand & Aronsson, 2009; Piirainen-Marsh & Tainio, 2009). Following an extensive review of the psychological literature, the authors found no empirical studies examining the phenomenological experiences of video game players' mental processes and consequent behaviour. Therefore, this paper examines how immersion in the video game environment can influence the player during the game and afterwards. More specifically, it is important to know whether experiences in the virtual world somehow influence players' mood state and mental processes (such as fantasies, thoughts, and actions). This is what the authors describe as Game Transfer Phenomena (GTP), that is, phenomena that occur when video game elements are associated with real life elements triggering subsequent thoughts, sensations and/or behavior among players. This may provide researchers with insights as how to more accurately measure gaming-related immersion phenomena.

Method

Participants: To be interviewed in the study, four inclusion criteria were used. Participants had to: (i) be frequent video game players, (i.e., play video games for at least 10 hours per week), (ii) have experience with different types of video games, and (iii) be between 15 and 21 years of age. This recruitment strategy yielded a total of 42 Swedish participants who were willing to be interviewed (39 males and 3 females). All the names given in the manuscript are all pseudonyms.

Materials: An interview protocol was designed to investigate Game Transfer Phenomena (GTP). (A copy of the full interview protocol used is available on request from the authors). Participants were free to present whatever they had experienced related to GTP. In order to initiate a conversation, an introductory question about "after image effects" was used, such as seeing a ghost image or dots everywhere when they closed their eyes after playing video games for a while, and/or looking at a wall and trying to fix the patterns such as in the game *Tetris*. In a few

cases a question about 'automated' or 'dissociative' experiences was used to explain to the players what type of experiences the research team were examining.

Procedure: In-depth semi-structured interviews were used to collect the data. Most of the interviews were carried out using e-interviews (n=33), whereas the remainder were carried out face-to-face (n=9). Participants were recruited from eight online Swedish gaming forums, supplemented with snowball sampling via the participants recruited from the gaming forums. The majority of the interviews took between 40 and 60 minutes, but on some occasions the online interviews lasted for almost two hours. All face-to-face interviews were subsequently transcribed.

Analysis: The primary form of analysis was a thematic analysis (Byrman, 2007). This was firstly done classifying players' experiences by type of phenomenon followed by a thematic analysis based on content. The data were first organized into core themes, and then displayed in terms of sub-themes within a matrix and for each case. Additionally, some parts of the interviews were quantified to show the incidence of GTP among the participants. These are displayed in the results' tables. Thematic analysis is a flexible analytical process that is adaptable dependent on the epistemological approach adopted to achieve the research aims (Braun & Clarke, 2006). In simple terms, thematic analysis can be used to extract new, unanticipated themes if the analyst is engaging in explorative research.

Analysis began with the detailed familiarisation of all interview transcripts, with the reading and re-reading of each transcription across several occasions. Codes were subsequently generated for all items that held semantic meaning in relation to GTP. The coding process organised the data into meaningful categories, and from this point attempts were made to extract themes by analysing the codes from a broader, more abstracted, perspective. The search for themes consisted of identifying repeated patterns and overarching relationships across the long list of codes. Subsequently, the researchers returned to the transcripts to determine whether the themes produced are accurately representative of the data provided, and minor changes were made based on this review of the thematic hierarchy produced in relation to raw data. In general the validity and reliability of the findings was ensured in different ways. Following a pilot study, the main study was done with the most appropriate participants (i.e., frequent video game players) with an interview protocol based on real player experiences. Furthermore, for a qualitative study, a relatively high number of interviews were carried out. This ensured that the findings did not just relate to a very small number of players.

Results

Game Transfer Phenomena (GTP) were classified into two main categories. The first type of GTP comprised those that occurred involuntary, automatically, and without premeditation by the players. These were further sub-divided into four types: (a) dreams; (b) automatic thoughts (with further sub-categories including: (i) resolving real life issues using video game elements or as they do it in the game; (ii) thoughts accompanied by visual imagination; (iii) thoughts accompanied by reflexes or movements); (c) alteration of sensory perception (with further sub-categories including: (i) perception effects, (ii) hypnagogic experiences, and (iii) sensations in real life); and (d) automatic behaviours. The second type of GTP comprised intentional integration of video games into the players' daily interactions. These were further sub-divided into: (a) using video games as interacting mediums or tools; (b) modelling game character and game events; and (c) daydreaming about video games.

Involuntary and automatic GTP experiences

In the automatic GTP experiences, it was possible to observe how players responded to Real Life (RL) elements and game events in similar ways. These experiences occurred as intrusive thoughts or images. Automatic experiences not only occurred and disappeared, but some players had also integrated them into their day-to-day information processing routines or schemas. The highest occurrences were in the experiences such as (i) resolving real life issues using game elements or as the character does, (ii) experiencing sensations to do things as in the game, (iii) experiencing visual illusions, and (iv) seeing something in real life, and (v) feeling the need to play due to the identification of RL elements that look like or are remembrances of game elements. The level of intensity varied among the gamers. Some had made a simple association between RL and video game elements, whereas others had gone as far as to perform some actions as they would have done in the game. It appeared that players had experienced intrusion in their cognitive processing and learned from video games to react and to perceive things in RL, at least for a few seconds, in ways informed by virtual life. In some cases these automatic actions were triggered by a similarity between RL elements and the video game elements, and on other occasions, these occurred as some sort of automatic action where the players react to RL stimuli as they would do in the video game. In some cases, it appeared that these experiences were emotionally charged (see Table 1 for a complete list of involuntary GTP occurrences reported by the players either about themselves or their friends.

INSERT TABLE 1 ABOUT HERE

Dreams

Some of the gamers reported that they dreamed about video games. For instance:

> *"I've heard my little brother talk tactics from 'CounterStrike' or 'World of Warcraft' in his sleep"* (Alexandra, 19)
>
> *"Well I do that all the time. I´m a big 'Tetris' fan. I even dream about 'Tetris'"* (Simon, 15)
>
> *"I dreamt a quite a lot about 'World of Warcarft' when I played"* (Samuel, 16)

Automatic thoughts

Almost all the participants had at some point experienced some type of automatic thought about video games. Here, they thought in the same way as they did when they were gaming, such as using something from video games to resolve real life issues. Sometimes these thoughts were even accompanied by reflexes such as when they reached to click the button in the control without having the control in their hands. On other occasions, they visualized their thoughts in the form of game menus in a game.

Resolving Real Life (RL) issues using video game elements or as they do it in the game: Approximately half of the participants reported having thoughts about using elements from video games to resolve real life issues such as: using a boomerang or a hook, using a gravity gun to get things they cannot reach, zoom with sniper rifle to see something faraway, etc. For instance:

> *"The gravity gun from Half Life. I want to use pretty often. When you want something from the fridge and don´t wanna go all the way over there"* (Simon, 15)
>
> *"I played Tomb Raider and could reach something with the grapple Lara has, and when I saw a bowl in our pantry that I couldn't reach I wished I could have her grapple so I could've reached it!"* (Eva, 16)
>
> *"The thought just pop up in my mind, like "Oh, what if I were able to use my telekinetics to move this car out of my way so that I can drive pass with my moped"* (Anton, 15).

Occasionally, illogical conclusions based on the logic of the video game popped up in the mind of the players when they were doing their daily routines. For instance:

> *"After long sessions I can feel like I'm in the game still like about a week ago. I thought my food wouldn't finish if I didn't expand [be]cause I would run out of resources"* (Samuel, 16).
>
> *"Sometimes I can find myself trying to find a search button In Real Life. Like in 'World of Warcraft' you can use /who to find people :S…I was in a big crowd looking for my older brother and after looking for like 5 minutes I thought 'Ooh, I'm so stupid ill just use the /who function'. But then I realised how stupid it sounded"* (Linus, 19)

> *"If I go out after like playing Assassin's Creed for six hours. I can look at the walls and building and thinking oh maybe I can climb there because when I am in the video game I can run in the roof and climb and it follows me to the real life"* (Leo, 17)

Thoughts accompanied by visual imagination: Thinking in images and pictures by participants occurred when information was organized in intuitive and simultaneous ways using the emotional part of the brain (Grandin, 2006). For instance:

> *"After playing the game I moved like the character. You can 'think' you chose a subject you want the character to think about. And you hear him/her think that in reality. I imagined myself in this menu and chosen the topics I should think about like in the game"* (Simon, 15)

> *"I get different answering options as a picture in my head. My sister insulted me in some way, and I thought 'What am I going to answer? And I see it as options in my head. It usually only happens if I've been playing for a long time like a long gaming session* (Eva, 16 years)

Thoughts accompanied by reflexes or movements: Players' automatic thoughts sometimes occurred simultaneously with automatic movements, such as some kind of reflex where the players wanted to reach the game controls. For instance:

> *"After completing 'Prince of Persia: Sands of Time' when I accidentally dropped a sandwich with the butter side down, I instantly reached for the "R2" button. My middle finger twitched, trying to reach it. Only to discover that I didn't have a PS2-controller in my hands"* (Milton, 19)

> *"After playing longer sessions it sometimes happens that I push my fingers as I do in-game. After a long session of playing and communicating by pushing my finger to start transmitting my voice it sometimes happens that I do it in Real Life to speak with my girlfriend"* (James, 20)

One participant used to move his fingers according to his game rotation when he was processing information or thinking about something:

> *"I usually think of stuff like that when I'm at school and when I was playing wow I usually kept my fingers warm by pushing my fingers like if I pushed the buttons that I use in the game. I usually do it when I'm concentrating on something. I push my fingers in patterns and think of what that would do in the game its sort of meditative"* (Samuel, 16)

Alteration of sensory perception

Here, experiences were triggered by perceptual associations, such as visual or optical illusions (i.e., where the individual sees some RL stimulus and automatically thinks that it looks like an element from the video game). On some occasions, simple perceptual associations became more elaborate when players spontaneously found themselves looking for particular locations to shoot a gun from. Some players reported that this rarely happened, but in a few cases, players constantly experienced this as soon as they encountered stimuli that reminded them of those

game elements. For example open fields, high buildings, or forests. It appeared that the players enjoyed getting engaged in the routine of evaluating the weakest and the strongest points of the panoramic view, and in some cases, they even communicated their strategies to other people.

> *"Me and my friends were on a road trip and on a stop for some reason looked at a shower drain. For some reason in my head it looked like the face of a combine from 'Half-Life 2'. I actually pointed it out to my friends and they agreed as well"* (James, 20)

> *"I can think that someone I see walking by on the street looks like someone from a video game, for example "That guy coming out of the Konsum looks just like Gordon Freeman from 'Half-Life'. I feel surprised, because I don't go around expecting people looking like Gordon"* (Aron, 15 years old)

> *"I can still like try to find good camper spots IRL with out thinking about it like, ooh, that would be a nice spot to be a sniper but then I realize that I don't need camper spots In Real Life"* (Linus, 19)

> *"There is a large football court with some five meter high buildings around it when I then walk out in the football field I try to find all the weaknesses and strong points as well as hiding places then I sometimes wants to shout orders to my friends and start running into cover. I did this one time, but people just started staring at me"* (Charlie, 17)

Perception effects: After they had been playing for a while, some players experienced 'after image effects', such as seeing a ghost image or dots everywhere when they closed their eyes. Some players reported not being able to sleep because they could not stop seeing these images. These experiences were mostly associated with games like *Tetris.* Other players experienced 'motion after effects', when they looked at different points far away from the screen. Here, things seemed to be moving slowly as if the objects were levitated. These experiences were usually associated with games like *Guitar Hero* or *Rock Band.* One participant experienced 'earworms', where he would suddenly hear music from the game. For instance:

> *"I have experienced the 'Tetris effect' with another game called Hexic, a small game on XBox, where you match colors and shapes. One time I played six to seven hours in one day and then I couldn't sleep because I see these 'curves'"* (Carl, 19)

> *"After playing 'Guitar Hero' for many hours, one of my friends started seeing things as if he was still playing. Like when he was walking, he wanted to 'tap' everything he passed by. You tap the buttons on the guitar, so instead tapping things that were in a straight line just like it is in the game"* (Valter, 20)

> *"We also get the Guitar Hero effect after we played it for a while. After a couple of hours with it when we turn it off, everything slowly moves up for a short period. If you play 'Guitar Hero, play it for a while then turn it off, look at the wall or a bookshelf and you see everything moves slowly upwards like an optical illusion"* (Albin, 20)

Hypnagogic experiences: These occurred when players saw elements from the video games mixed with RL environments. For instance:

> *"When I went to a meeting with one of my teachers and she said something about guitars I suddenly saw the frets and the notes before my eyes and I could barely even hear her"* (Eva, 16).

> *"[After playing] the first thing that I thought of was a math lesson when I was imagining the equations in a bubble over the math teachers head. It felt weird and only lasted for a glimpse before I realised what I was seeing"* (Linus, 19)
>
> *"I started seeing health bars above people's heads. It was mostly when I played football in school in the breaks. We were losing in a game and when we started turning it to our advantage. I started to see stuff almost like some kind of "bar" when I look down that I could use to, I don't know, do something strange"* (Charlie, 17).

One player experienced hypnagogic speech that manifested itself as an 'inner voice' or as the voices of others such as familiar people or strangers:

> *"Right after playing 'Heavy Rain', [I] had inner monologues, started to think about choices and what consequences they would have"* (Albin, 20).

Another player reported a type of hypnagogic tactile experience:

> *"When just 'Cause 2' got released, I played it a lot for about two weeks. But when I tired of the game, and I was sitting at my windows, four floors up, I thought 'It would be so awesome if I could [tie a] hook to that car and get to town that away' and felt like pressing the 'F' [button on the game pad] but it was like a reflex"* (Milton, 19)

Sensations in real life: Some players experienced sensations, impulses, and/or flashbacks when they associated stimuli from the RL with game elements. They felt the urge to do something, or felt that something would appear or happen. For instance:

> *"When I had played 'Bionic Commando' for a long time, in reality it felt so weird not to have the Bionic arm"* (Tobias, 15)
>
> *"In 'Assassin's Creed' you move a lot in big crowds of people. The method of doing so efficiently is that he kind of gently pushes everyone out of the way. I remember feeling an urge for doing so in a crowded street"* (Maximillian, 18)
>
> *"I got that urge though to climb and explore after I played 'Shadow of the Colossus'. Something that you really want to do, almost as if you must do"* (Albin M, 21)
>
> *"I still sometimes get these flashes that I want to throw myself down stairs, especially at subway stations which the first level of the game is set in. I had flashes when I want to steal cars, like open the door, punch the driver, throw him out and steal the car"* (Carl, 19)

Automatic behaviours

Some players also experienced some type of dissociation when they suddenly performed actions as they did in the game, and a few seconds later they realized what they were doing. For instance:

"I remembered when someone told me to dance. I think it was in school or something. I started dancing as the chars in 'World of Warcraft' but then I realised what I was doing and stopped" (Linus, 19)

"When playing a lot of 'Grand Theft Auto' I felt like I was still in the game. So I walked to the bike and thought about taking it when I realized what I was doing" (Simon, 15)

"When I was giving a presentation I wanted to press the 'shift' button to start the microphone, because I had a function in the computer. But in Real Life when I was giving the speech, I couldn't find the button. I was looking for my keyboard in the air but it wasn't there" (Carl, 19)

Intentional GTP experiences

This section examines Game Transfer Phenomena that occurred when players integrated video games into their daily routines voluntarily or deliberately. Here they used video game content for joking, playing, and imagining and pretending together (see Table 2 for a complete list of intentional GTP occurrences or reports by players of others who had experienced such effects).

INSERT TABLE 2 ABOUT HERE

Using video games as interacting mediums or tools

Several players integrated video games into their daily interactions as. They used one-liners from video games, reproduced game movements, and applied computer game point systems to RL routines and events. The players also made jokes with, and about, video games. Some players reported that they reproduced video game content mainly by taking phrases from the video games, whereas others modelled the game characters' movements. For instance:

"I send spells to others, moving hands" (Arnold, 15)

"I did hide in a box like 'Solid Snake' does, to scare a friend of mine" (Adrian, 21)

"We started talking like 'Cowboys'" (Simon, 15)

Other players continually used the game point system to joke with each other. For instance:

"I've played a lot of 'Final Fantasy XI' with two of my friends. We use to joke around about how we gain a skill or rise a level in whatever we do, such as cooking, cleaning, etc" (Sixten, 21)

Additionally, some players, more in the older group used phrases from the video games for joking and interacting with each other:

"Me and my friend had been playing 'Resident Evil 5' a lot and we had become stuck at a certain place were the players are being chased by motorcycles. One of the game characters then bursts out 'They just don't let up do they?' in the weirdest voice which stuck in me and my friend's mind. Now when we see a motorcycle, it's not uncommon that we say 'They just don't let up do they', just for kicks" (James, 20)

Players also shared fantasies or play:

> *"You know, with friends. One time we joked about running faster with a knife like you do in 'CounterStrike'. Never did it though. Just imaginary"* (Adrian, 21)
>
> *"My gaming friends and me will often joke with each other, like 'this school lunch looks like a barbecued locust' (enemies from the game 'Gears of War 2')" (Aron, 15)*

Some players even tried to apply things in RL that they have learned from the video games. For instance:

> *"We played 'Laser Dome' with school. Everyone just ran around blasting each other, but I tried to apply things that I've learned in games: Taking cover, firing in bursts, flanking, communication, hand signals and etc."* (Carl, 19)
>
> *"When I pack, I often place my things like 'Tetris' blocks. And make it into a game. It becomes more fun then before"* (Simon, 15)
>
> *"Sometimes I would bake 'World of Warcraft' food IRL. They have a lot of different breads so I would try to make those IRL like pumpernickel, but also easier food like cinnamon rolls"* (Adam, 15)

Daydreaming about video games

Some players engaged in daydreaming about video games. They did this when they were at school, travelling, and/or when they felt bored. The most common fantasies were about being able to have super powers or to live in a game environment. Sometimes they integrated elements from real life with their daydreams about video games. On other occasions, their fantasies were located exclusively within the game world. For instance:

> *"What I wanted was to live in the 'Final Fantasy' universe and be one of the characters. So all of the time, I imagined living in that world. It wasn't really bad thoughts, more like wishful thinking"* (Milton, 19)
>
> *"Every time I'm in the subway, I picture myself running on top of it and dodging poles and stuff, and then running on the track and avoiding another train by centimetres, like I did in 'Mirror's Edge'"* (Alex, 15)
>
> *"Sometimes I dream about games, and sometimes when I let my mind wander freely, I wander around in the 'World of Warcraft'. I don't think of anything special, or sometimes when I´m about to go to sleep and you're clearing your head and relaxing"* (Alexandra, 19)
>
> *"One time when I was in the forest I started to imagine how it would be to Naked Snake in 'Metal Gear Solid 3' and sneak. I was just strolling around and was kind of bored when the thought struck me. So I imagined that the scenario in the game would happened in Real Life and that I was Naked Snake in that scenario"* (Charlie, 17)

GTP and aggression, violence and risk behaviour

The analysis of the content of the transcripts contained many GTP references to violence, aggression and risk behaviour (see Table 3 for a complete list of GTP occurrences related to violent and aggressive thoughts).

INSERT TABLE 3 ABOUT HERE

Aggressive or violent play

Some players mimicked video game characters in a playful way when they played with friends. For instance:

> *"I pretend to curb stomp (kick someone lying down in the face) when they trip"* (Aron, 15)

A few players reported that they felt the urge to push people when they were in a big crowd. In games like *Assassin's Creed*, the game character can push people that cross his path. It appeared players learned the push movement as a reflex, but they constrained themselves in real life since they knew it was not socially acceptable. For instance:

> *"People always walked in front of me in the game which annoyed me, and I sometimes feel the urge to push people out of my way In Real Life"* (Eva, 16)

Violent solutions to real life conflicts appeared to be used by few of the players, at least in their imaginations. For instance:

> *"If your teacher is irritating, you just want to grab a gun and shoot her. I would never do something like that. Yep, fantasy. Weird I know. It comes in a scene where she is being tortured, not by me, but by someone else. It makes me glad"* (Anton, 15)
>
> *"Sometimes I want to have things that you have in some games like for example 'Metroprime'. There you can get guns. This I want to do in real life, to get some guns, shoot down people. This I want to do sometimes with irritating people. If they are pretty faraway and they have been messing with me a long time, then I want to shoot the head and just go"* (Arnold, 15)

Some players enjoyed imagining dangerous sceneries and planning escapes. For instance:

> *"I can dream like 'Oh here I can hide if zombies come when I am in town' or 'Like here can a barricade myself if they come'. I really want to try out guns that I have found in games to shoot at targets or even take like a beret sniper and where I can put it so I can shoot zombies"* (Tobias, 15 years)

Criminal thoughts

Criminal thoughts were reported by few of the participants. For instance:

> *"I just felt like throwing myself in front of a car just to get the insurance money as they do in 'Saints Row'"* (Eva, 16)
>
> *"Sometimes we [talk about whether we] should rob the bank, but we just are joking about it, we are not serious"* (Per, 16)

Some players reported desensitization in relation to dangerous and violent situations.

> *"When I see someone fighting with fists I think 'Skill in unarmed. 400 achievement [points] earned. Someone ordered a knuckle sandwich? [Because] that's fun in 'World of Warcraft'"* (Omar, 15 years)
>
> *"It has happened when someone is driving, and where waiting to people to cross the road. We can say like '10 points' meaning the sick point system in 'Grand Theft Auto'. That if we would drive through, we would have gotten 10 points. In 'Grand Theft Auto' you get points/money for wrecking things and killing people. So when you kill people by driving over them, you get money! Wonderful isn't it?* (Jesper, 19)

Dangerous behaviour

Some players experienced impulses or sensations when they associated real life environment with games elements, and they felt the impulse to perform as in the video game. For instance:

> *"I remembered 'Max Payne'. I still sometimes get these flashes that I want to throw myself down stairs, especially at subway stations which the first level of the game is set in"* (Carl, 19)
>
> *"I've done similar things. I think that I can do 'bullet time' and throw myself to the floor and hurt myself. 'Bullet time' is when everything is in slow motion except one thing, like in 'The Matrix'. For me it was a game named 'Wet' and it happened the same day that I played it"* (Simon, 21)

A few players reported that they wanted to perform things as in the game. For instance:

> *"When my brother says that I want to get a driving license, I tell him that I will drive like I drive in 'Grand Theft Auto'. And spin around and drive on two wheels"* (Noel, 16)

A few players reported that someone they knew performed a dangerous behaviour based on video game content. For instance:

> *"A friend and some of his friends were playing 'Burnout 3'. Afterwards, when they were in a car, the driver started to accelerate quite a lot, it was quite scary"* (Max, 19)

Perception of the world as dangerous

Some players reported that their perception of the world had changed, at least temporarily, when they found themselves integrating dangerous scenarios in the real life environment. Most

of the time these experiences appeared as a thought, but one player even performed an action to avoid the possible danger:

> *"I was walking in the woods near my home and I just wanted to walk on the path because then it's less likely to get attacked my mobs"* (Linus, 19)
>
> *"I was in the airport recently, and there is a sensor in 'Call of Duty: Modern Warfare 2' where you go as a Russian and kill all civilians on this airport. I had this flash that the Russians would come out of the elevator"* (Carl, 19)
>
> *"In 'Alan Wake' you're walking in a forest and there are bad guys in all the shadows, and they are waiting for you. If I walk in front of a forest, and hear something in the bushes then I'm thinking that it might be a murder"* (Per, 16)
>
> *"I was helping my father and he gave me a torch. It was too dark and it reminded me of 'Resident Evil'. I was moving like [I would do] in 'Resident Evil', and told my father what if a Zombie comes out now"* (Benny, 17)

Discussion

The findings of this study suggest that most players in this study at times got emotionally engaged in video games. However not all the players' mood states were affected by game playing. This depended upon how serious they took their game playing involvement. The personal characteristics of the individual may have influenced the presence of Game Transfer Phenomena (GTP) experiences. However, different individuals have reported similar phenomena in the same games. The reports that were similar concerned an array of activities including: climbing buildings, planning to shoot in real life sceneries, zooming in to see things in real life with a sniper rifle, and moving fingers or performing involuntary movements such as when they were actually playing the video game. Some players experienced hallucinations such as boxes hovering over peoples' heads. Other players reported having quite similar experiences in games like *Grand Theft Auto, Assassin's Creed, Alan Wake, Heavy Rain, Half-Life, Tetris*, and *Guitar Hero*.

The findings here, while based on a small number of video game players, show that playing video games intensely can be associated with the elicitation of automatic thoughts, altered perception of real life sceneries, alteration of sensory perceptions, and dissociative experiences. Some players may be more vulnerable to experiencing automatic GTP. However, almost all of the players reported some type of GTP, but in different ways and with varying degrees of intensity. Most of the players appeared to perceive GTP as a natural consequence of their high engagement in video games. When their playing decreased, the GTP would disappear However, some participants expressed that they had felt scared and concerned due to bizarre

GTP experiences. These experiences were not considered as topics to be discussed with relatives or friends.

The close resemblance to real life sceneries in video games may have opened a 'Pandora's Box' for some players. Players in this study found themselves in negotiation between the real life world's daily encounters and their experiences and memories from the virtual gaming world. Players claimed they were well aware of the difference between the real life world and the game world, but their automatic associations caused them, at least some of the time, to experience something they felt was bizarre. However, this cannot be conclusively confirmed because (i) most of the interviews were conducted electronically without information relating to the psychological stability of respondents, and (ii) participants made fairly consistent reports of psychological disturbance (e.g., hallucinations, delusions, dissociation) based on their involvement with such games.

Among the GTP reported by the players, there were experiences immediately after finishing playing, as well as experiences between periods of intensive playing. Some GTP took place intentionally, but in some cases they appear to have occurred without any premeditation by the players. Here, the players said they experienced intrusive thoughts, sensations, impulses, reflexes, or optical illusions. In some extreme cases, this even resulted in automatic behaviour or dissociation. Sometimes, the GTP involved unique experiences, but other cases were more habitual.

On some occasions, players mimicked video game characters or reproduced video game phrases for amusement. Furthermore, players, on several occasions, engaged in fantasy activities without premeditation, deploying illogical solutions using video game tools and processes for resolving real life issues. For example, when one player was looking for his brother in a big crowd, he wanted to use the search button facility. Some participants perceived, interpreted and reacted to real life stimuli as they would have done in the game world. Most of these reactions appear to involve relatively short-term effects.

Previous studies have demonstrated that it is possible that basic associative conditioning phenomena occur within virtual worlds (e.g., Hamilton & Sutherland, 1999; Grillon et al, 2006; Alvarez et al, 2007). Furthermore, a study done by McCabe, Tobler, Schultz, Dickinson, Lupson and Fletcher (2009) suggests that a stimulus in the virtual environment can acquire motivational properties that persist and modify behaviour in the real world. Among the GTP experiences, some players had replayed game strategies in real life imagery where they found themselves paying more attention to ceilings, feeling the urge to swing, jump and climb when

they for example looked at buildings, since they could climb in the video games they played. Additionally, some players found themselves suddenly paying attention to doorways or open fields and trying to find the weakest and strongest points, where to snipe, hide or how to escape, as they do in the game. Certainly, success in video games requires various skills like detecting, monitoring, tracking, and intercepting moving targets (Goldstein, 1994) and this may improve the players cognitive skills in the players (Greenfield, et al., 1994) while automatic associations may change players' perception of the world (Anderson, et al., 2007).

Repetitive tasks in video games also appear to affect players in other ways. In some cases, automatic thoughts are accompanied by an "ideo-motor reflex" (Stock & Stock, 2004) or automatic muscular reaction due to, for instance, the "priming movement" (Kibele, 2006) of pushing buttons. Some players found themselves trying to reach for buttons on the control in the air when something happened in real life. For example one participant tried to reach for the button to reload the game when he had dropped his sandwich on the floor. Even trivial routines like establishing a conversation appear to have been conditioned to push buttons, as a few players reported that they moved their fingers as if they were pushing the "shift" button, while they were talking outside of the game. Another player moved his fingers with his *WoW* rotation while he was thinking in a meditative way. Automatic associations also triggered video game instructions or scripts as ways to behave in players' minds. For example one participant had experienced intrusive semantic memories manifested as inner monologues, like the ones in the game when he approached real life objects.

Some players reported alteration of the sensory perception and hypnagogic experiences triggered by video games. Hypnagogic experiences "can occur in all the sensory modalities, sometimes different sensory modalities can be engaged in the same event" (Mavromatis, 1987; p.14). They are considered as "hallucinatory and quasi-hallucinatory events that [occur] in the intermediated state between wakefulness and sleep" (Mavromatis, 1987; p.14) that do not appear to be related with memory systems (Mavromatis, 1987, Stickgold et al, 2000). Suggestibility seems to be one of the most prevalent features of hypnagogia (Mavromatis, 1987). In a previously published case study, one player reported experiencing constant auditory imaginary triggered by a video game sound track (Spence, 1993).

In this study, the simplest cases related with alteration of the sensory perception were reported right away after the players stopped playing, when objects seemed to levitate or move slowly when the players took their eyes from the screen or when the players had seen images when they closed their eyes or when they were falling asleep. This phenomenon is usually connected with Tetris-type and music games with scrolling notes.

In other cases, players' experienced hypnagogic visualizations where they saw intrusive items from video games integrated into real life environments. For instance, some players saw text boxes hovering above peoples' heads. Another player saw coloured fret buttons from *Guitar Hero* when her teacher said the word 'guitar'. Interestingly, all the participants who experienced these phenomena were in stressful situations. The initiation of physiological reactions in real life may have played an important role in this type of dissociative experience as an escape mechanism. Additionally, a tactile experience was reported by a player experiencing the sensation of pushing a pad button when a game-related thought entered his consciousness.

One of the most invasive automatic GTP occurred when players not only experienced sensations, urges, and/or impulses, but when they found themselves incapable of controlling their behavior, and actually did something without intending to do so. This was illustrated with the case of the player who at a party started to dance as his game character did or the player that thought he was still in the game and almost stole a bicycle. The use of aggressive, criminal and/or violent fantasies for solving social problems was reported by a few of the players. Furthermore, some players also reported intrusive thoughts and sensations related to violence, and some had even acted in order to avoid possible danger. The Trauma Film paradigm may help to explain this phenomenon (Holmes & Bourne, 2008). Perceptions of the world as dangerous can be exemplified by sensations. For example, a player thought that when she opened a door she would find a man with guns. Others had thought that zombies would appear, or that strange things would happen. One player perceived the night as more sinister, while another thought that someone was murdered in the forest. Another player had assumed that if he only walked on certain paths he would less likely be attacked. Based on the date collected, the authors are of the opinion that GTP is not a form of immersion although those who are more immersed in gaming may be more susceptible to experiencing GTP. Admittedly, this is speculation on the authors' part and needs conforming through further empirical research.

Limitations: There were, of course, certain limitations to this study. Even though it was found that GTP experiences were common among the participants in this study, it does not necessarily say much about the incidence of GTP among all frequent video game players. This study was a relatively small one with a restricted scope, and the findings cannot be generalized in a mechanical way. However, the study is probably the first descriptive study that has attempted to explore GTP. Furthermore, the questions used in the interview protocol may have influenced the experiences reported by the players and the incidence of certain experiences. However, the semi-structured interviews were flexible enough to allow for new

and/or unexpected experiences to be reported. Moreover, the players were continually encouraged to exemplify and provide their own spontaneous accounts about their gaming experiences. The method used for carrying out most of the interviews was the use of online interviews. This mirrored the natural setting that was being investigated (in this case video game playing experiences). The online setting allowed participants to be interviewed in a familiar medium and created a more egalitarian communication between the players and the interviewer (Salmons, 2010). However, the participants' responses, might in some cases, have been influenced by external distractions that may in turn have affected the participant's engagement.

Conclusions: This study was unique in that it explored players' experiences from a phenomenological perspective. However, we are still in a period of adaptation to the effects of interactive media consumption. The incidence of cases of GTP among young people demonstrates human suggestibility, and it seems important to encourage more research in this promising area. As noted above, almost all of the players reported some type of GTP, but in different ways and with varying degrees of intensity. In future studies it would be useful to collect data regarding the intensity of these experiences, subject these data to further quantitative analyses, and identify relationships among these variables, particularly how the "way of experience" and "intensity" are related to cognitive, emotional, and behavioral outcomes for participants. There is also the question of whether GTP is something that relates to *the game* played or something that relates to *specific gamers*. This study cannot determine whether GTP is an experience all gamers expected experience after playing a particular length of time of gaming, or whether there are some people that have predispositions that make them vulnerable to GTP experiences. Identifying those players 'at risk' of experiencing GTP should be one of the main objectives of future research.

A recurring trend suggested that intensive gaming involvement may lead to negative psychological, emotional, or behavioral consequences. Therefore, it may be useful in future replications to consider redesigning the study (with reliable and valid assessment methods, a large random sample, and a combination of both rigorous quantitative and qualitative analyses) with the goal of determining if intensive gaming involvement does lead to such consequences. The results of such a study could have enormous implications for software developers, parents, policy makers, mental health professionals and a host of other vested parties.

Undoubtedly, the presence of the GTP may depend on individual characteristics. However, it is interesting to note that different individuals had similar experiences in the same games. Modern video games' realistic sceneries may trigger associations between the two worlds among some individuals. Future research should attempt to establish the relationship between GTP and player's individual characteristics, as well as analyses of video game types and GTP.

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Table 1: Players' automatic and involuntary game transfer phenomena

***AUTOMATIC GTP* (N= 42 participants)**	***Player Report***	***Player Friend Report***	***Total***
(1) DREAMS			
Subtotal	**2**	**2**	**4**
(2) AUTOMATIC THOUGHTS			
(A) Intrusive thoughts/memories	7	-	7
(B) Resolve RL issues with game elements/Resolve RL issues as the character does	21	-	21
(C) Thoughts accompanied by visual imagination	2	-	2
(D) Thoughts accompanied by reflex-like or movements	3	-	3
(E) Analyzing RL environment as if they were in the game	6	-	6
(F) See something in RL and feel to play or think of the game	10	-	10
Subtotal	**49**	-	**49**
(3) ALTERATION OF SENSORY PERCEPTION			
(A) Visual Illusions (Seems to be as in the game)			
Things/animals	7	-	7
Sceneries	3	-	3
(B) Earworm	1	-	1
(C) After image effect	4	2	6
(D) Motion after effect	2	-	2
(E) Hypnagogic visualization	4	-	4
(F) Hypnagogic speech	1	-	1
(G) Hypnagogic tactile	1	-	1
(H) Sensations			
Sensations/flashbacks	10	2	12
Urges/impulses	3	-	3
Subtotal	36	4	40
(4) AUTOMATIC BEHAVIOURS			
Dissociation	4	3	7
Subtotal	**4**	**3**	**7**
Total	91	9	100

*****Note: The sub-categories were only counted once per individual even if there were multiple

Table 2: Players' intentional game transfer phenomena

INTENTIONAL GTP* **(N= 42 participants)**	***Player Report***	***Player Friend Report***	***Total***
(1) USING VIDEO GAMES AS INTERACTING MEDIUMS OR TOOLS			
(A) Using video game catch phrases for joking IRL	7	2	9
(B) Using game score systems IRL	2	-	2
(C) Comments about video games	3	-	3
Subtotal	**12**	**2**	**14**
(2) MODELLING GAME CHARACTER AND GAME EVENTS			
(A) Imitating or mimicking video games movements IRL	10	1	11
(B) School projects	1	1	2
(C) Doing things differently due to what has been learnt in the game/ Applying what they have learned in the games in RL	9	-	9
(D) Fantasize or play with others	7	-	7
Subtotal	**27**	**2**	**29**
(3) DAYDREAMING ABOUT VIDEO GAMES			
Subtotal	**21**	**-**	**21**
Total	**60**	**4**	**64**

*The sub-categories were only counted once per individual even if there were multiple occurrences).

Commented [A1]: Is this word correct?

Table 3: Game transfer phenomena and aggressive, violent, or threatening thoughts

GTP AND AGGRESSION, VIOLENCE AND RISK BEHAVIOUR* **(N= 42 participants)**	***Player Report***	***Player Friend Report***	***Total***
Perception of the world as dangerous	11	2	13
Perceives RL sceneries as battlefield	11	-	11
Desensitization	8	-	8
Dangerous behaviour daydream	4	-	4
Dangerous behaviour thoughts w/sensation	7	1	8
Dangerous behaviour with action performed	1	1	2
Aggressive/violent play (e.g., modelling)	2	-	2
Aggressive/criminal thought with urge to do it	4	1	5
Violent/Criminal daydream	11	2	13
Criminal thoughts with automatic action	1	-	1
Total	60	7	67

*****The categories were only counted once per individual even if there were multiple occurrences).