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Discovering the virtual fingerprint: Analyzing embodiment, immersion, and player personality in video games

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Discovering the Virtual Fingerprint: Analyzing Embodiment, Immersion, and Player Personality in Video Games

by

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Abstract

This thesis set out to explore embodiment, immersion, and personalities in massively multiplayer video games (MMOGs), in particular how players become immersed in a virtual world. Immersion is a focal point in the gaming experience in which players communicate directly with the digital medium. Scholarship has argued that games have specific immersive qualities that draw players into them including storytelling, social and emotional reasoning, among others (Calleja, 2011). Each player has a particular preference as to what immerses them the most in a game. In addition, research has concluded that gamers have unique personalities that they portray while they embody themselves in these virtual environments (Yee, 2007). These personalities align with characteristics of immersion, but the models have not been cross examined until now. Through the correlational analysis of data gathered by MMOG players, relationships between the models became evident. Results were used to develop virtual fingerprints for each personality, or how each persona becomes immersed in an online video game.

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Introduction

Video games are mainstream and an aspect of everyday life for many U.S. Americans (Williams, Yee, & Caplan, 2008). Over the last few decades, gaming has swollen to a 10.5 billion-dollar-a-year industry (Entertainment Software Ratings Board, 2010), that encompasses people through immense cultural influence. The stereotype that the gamer is a teenage boy tucked away from the summer sun in his parents' basement should no longer be stigmatized and generalized. According to the Entertainment Software Ratings Board (2010), 67 percent of U.S. household members play video games; the average age of a gamer is 34. With these statistics in mind, gaming has become a staple in American life that requires close attention from communication scholars.

Games are about people, and when people are involved, communication scholars become eager to analyze the interactions within that community (Williams, 2013). Online gaming has become a focus in recent research, in particular how video game players communicate to one another in a virtual environment. Examples of communication scholarship in video games include the use of voice in an online gaming community (Williams, Caplan, & Xiong, 2007), the social lives of game players in an online virtual game space (Williams et al., 2006), the rhetoric of avatar creation (Kolko, 1999), and the immersive properties of games (Calleja, 2011). These are just a few samples of the vast pool of research available on gaming, but this scholarship has the potential to dive even deeper than the basic interactions between users.

Research illustrates the ways a video game player communicates directly with the game itself and vice versa, including studies on immersion or the direct psychological communication

that someone has with a video game (Brown & Cairns, 2004; Calleja, 2011; Jennett et al., 2008). Similar to getting lost in a book or pulled into a movie, video games have the capability to engross a person in a virtual environment. Unlike novels and film however video games can immerse users through a combination of means that can make them completely embodied in a virtual world (Calleja, 2011). Virtual embodiment is a communication concept that has been defined as a "vision of digital mediation which is predicated on the possibility that a digital game could be so immersive that there would be no way for the player to know that they were in the game" (Iacovides & Farrow, 2013, p. 231). As technology improves, the importance for communication scholars to understand the immersive qualities of games becomes vital. Virtual reality headsets like the Facebook owned *Oculus Rift*, Sony's *Project Morpheus,* and Samsung's *Gear VR* are becoming mainstream (Morris, 2015) and will offer consumers new and improved ways to immerse themselves in video games.

Before the next generation of immersive experiences hit the market, video game creators like Electronic Arts, Activision-Blizzard, and Microsoft should understand that "people choose to play games for very different reasons, and thus, the same video game may have very different meanings or consequences for different players" (Yee, 2007, p. 774). Video game player motivations (why people play games) have been uncovered in communication research, and unique personalities for gamers have been developed from these characteristics (Bartle, 1996; Williams et al., 2008; Yee, 2007). Understanding video game player motivations can assist game companies in creating experiences that can be marketed to specific types of gamers (Yee & Ducheneaut, 2015). For example, if a game developer has the knowledge that potential players are motivated by high paced action, they can design a virtual environment that encompasses that motivation. In order to take this concept one step further, the inclusion of unique immersive

qualities for each player should be included. This next step can transform games from generic mass-produced entertainment to tailor-made immersive experiences created for a specific user's personality.

Combining player personality and preferred immersive game qualities is a gamer's virtual fingerprint; a unique attribution that can assist researchers in understanding video game players on an individual rather than collective level. A gamer's virtual fingerprint includes the immersive characteristics that relate to a specific player personality and thus identifies what immerses a person the most in a digital world. This study sets out to explore the relationship between player personality and immersion and to see if virtual fingerprints can be uncovered in massively multiplayer online games (MMOGs). To begin, literature is discussed on the avatar, which underlines the immersive experience in a video game. Next, a process of immersion is uncovered followed by player motivations and personalities. To conclude, embodiment in MMOGs is discussed.

Literature Review

The Avatar

Embodiment has been difficult to define in video game research (Taylor, 2002), but it involves a virtual body, or avatar, as a display device for the mind of the player (Biocca, 1997). In other words, the avatar grounds the mind and makes players present in the virtual world (Taylor, 2002). Gee (2008) explained this further by stating that video games "are a new tool with which to think about the mind and through which we can externalize some of its functions" (p. 254). These functions include communication, movement, and even sexual orientation, among other characteristics (Gee, 2008). Avatars could also be thought of as the root of where player personality is displayed.

An avatar is a human-controlled virtual character that "form(s) one of the central points at which users intersect with a technological object and embody themselves" (Taylor, 2007, p. 41). The avatar is the main ingredient in the embodiment experience in video games. Examples of famous avatars include Mario, Sonic, and Link from the *Legend of Zelda*. More recently, however, role-playing games (RPGs) and their siblings MMOGs (Massively Multiplayer Online Games) have introduced creative customization when it comes to avatars, giving players complete control over the creation of them. MMOGs are persistent online game worlds that are focused on interactions between other players to defeat computer-controlled bosses, create and trade virtual items, and even kill one another.

Avatar creation sets the communicative tone for the environment of the game, and it has a direct impact on the interaction in online environments (Kolko, 1999). For example, in the popular MMOG *World of Warcraft,* players can choose from dozens of races, play styles, and customization choices. Depending on the selection of these options, the player will have a different gameplay experience. Most notably, players can create entities that have no relation to themselves. For instance, a disabled, male Iraq War veteran can play an MMOG as a quick-footed avatar that looks similar or nothing like himself. This veteran can even play as a female if he so chooses. The creation of an avatar creates a baseline of attachment between the player and the virtual world (Wolfendale, 2007) and sets the stage for embodiment.

Wolfendale (2007) suggested that avatars have more substance than just an imaginary figure forged of pixels. Substance is formed during the avatar creation process, but also during the gameplay experience where avatars take on tasks that would otherwise be deemed impossible in real life. In other words, becoming a hero and seeing it unfold gives an avatar a sense of meaning and corresponding substance, for example, in a game like *Skyrim* in which players

create warriors and wizards to defeat powerful dragons and other mystical creatures. Forays like this would not be possible in real life and have been noted to benefit the embodiment experience (Iacovides & Farrow, 2013).

Garau, Slater, Vinayagamoorthy, Brogni, Steed, and Sasse (2003) discovered that visual and behavioral realism has a positive impact on the communicative effectiveness of the avatar. In other words, realistic graphical representations and animations can have a positive impact on embodiment. If an avatar appears more real and human, Garau et al. argued that communication by and with that avatar is better. Although their study did not involve a video game, the notion that communication is important to the avatar should be kept in mind.

Another interesting finding in the literature included the goals of players and avatars in games. Gee (2008) found that players take on the goals of their avatar while imposing their own. For instance, a virtual character could be a violent, blood-sucking vampire, but the user playing that avatar enjoys using stealth to avoid conflict in the game's environment. This confliction of goals creates a conundrum in the embodiment experience. In theory, in order to take on the role of the avatar completely, the stealthy player would have to adapt to the violent mission of the game's avatar. It is hard to determine if users always alter their goals to that of the avatar or vice versa.

Although the avatar is an important aspect of embodiment, there are other factors that play a role in the process. The literature uncovered a process of immersion that can be viewed as the gateway to embodiment in video games.

The Process of Immersion

Embodiment is not instantaneous, but rather there is a process of immersion that takes place (Brown & Cairns, 2004; Calleja, 2011). Immersion in video games can be defined as "a

lack of awareness of time, a loss of awareness of the real world, involvement and a sense of being in the task environment" (Jennet et al., 2008, p. 657). Immersion, then, can be thought of as the stepping-stones to becoming embodied. Brown and Cairns (2004) discovered three levels of video game player immersion including engagement, engrossment, and total immersion. Engagement refers to the introduction of a game including genre and controls. Genre and controls have to align with the player's personal interests in order for the player to become engaged. If, for instance, a user enjoys first person shooters over life simulation games, they will become more immersed in a first person shooter game than the life simulation. Second, engrossment is when the game's features strike at the player's emotions, or when a user becomes emotionally invested (Brown & Cairns, 2004). Last, the player becomes totally immersed in the game world. A participant in Brown and Cairns's qualitative study described this as "when you stop thinking about the fact that you've been playing a computer game and you're just in a computer" (p. 1299). From this account, total immersion is looked at as embodiment in this study, where the mind is completely grounded in the virtual world (Biocca, 1997).

Calleja's (2011) Player Involvement Model provides additional research by explaining six characteristics related to a user's immersion in a game: control in the environment, exploration of the world, shared involvement, story elements, emotions generated during gameplay, and the pursuit of goals and choices. Although embodiment is not directly applied, these characteristics are supported by other research in immersion and embodiment. Gee (2008) argued that a player takes on the ambitions of the character they control while also implementing their own personal goals on the avatar (pursuit of goals and choices). Taylor (2002) noted that communication, and social integration is crucial to embodiment in online games (shared involvement). Herrewijn, Poels, and Calleja (2000) discovered the importance of story in

relation to embodiment and immersion (story elements). Emotions generated during gameplay were touched on by Jennet et al. (2008). With these similarities in the literature, it is safe to say that immersion is the path towards embodiment. In other words, as a player becomes immersed through Calleja's characteristics, he or she will eventually become embodied in the virtual space. Brown and Cairns (2004) and Calleja (2011) failed to mention this, but their work can be used as an instruction guide as to how to analyze embodiment in gaming.

Of the characteristics outlined by Calleja (2011), the use of story and emotions generated by a game is among the most prevalent in research. Included in their study of game immersion, Brown and Cairns (2004) found that empathy played a part in the level of immersion a player had. Those that were not empathetic towards the game's story, characters, or environment were not as immersed in the experience. In a more in-depth study done by Jennet et al. (2008), they were able to find that emotional involvement was beneficial to a gamer's immersion. Despite this finding however, they did not use a real game but rather a laboratory setup to test their hypothesis. The emotional impact of the immersion or embodiment process needs to be analyzed "in the field" before solid conclusions are drawn.

Herrewijn et al. (2000) examined the narrative story of a single player game and how it immerses the player. They found that the more detailed a story's components were, the more the player was immersed. Similar to Jennet et al. (2008), this study was conducted in a laboratory using a highly modified version of a game. Again, it is important that this be tested and analyzed using a real game, for example, using the ideas presented by Herrewijn et al. (2000) in a story rich game like *Halo*. In addition, it would be equally important to further study story and immersion relation in multiplayer games similar to *World of Warcraft*.

Gee (2008) stated that "players inhabit the goals of a virtual character in a virtual world" (p. 258). In other words, the goals and choices a player makes becomes evident from the second they start playing the game. Gee referred to this as inhabitation in the virtual environment, where the player takes on the main character's goals to become embodied. This is highly evident in traditional single-player games where main characters have missions to complete or a point a-to-b trajectory through the world. For example, when playing a Super Mario game, Mario's mission to save Princess Peach becomes the players' personal goal.

Another aspect of immersion as discussed by Calleja (2011) is shared involvement, or the social characteristics of a video game. In embodiment research, Taylor (2002) mentioned how social life in games "prove(s) to be the material out of which relationships and interactions are embodied" (p. 41). In her research, she conducted interviews with players of an online role-playing video game and personally partook in specific social events in the game including weddings, games, and hangout sessions. She concluded that social integration-in particular, communication between others-plays an important role in online embodiment.

Control and movement in the environment and exploration of the world fall into a spatial category together (Calleja, 2011). In earlier research completed by Calleja (2007), he mentioned these aspects as spatial involvement or "locating oneself within a wider game area than is visible on the screen" (p. 253). This includes mental maps of the game world, directions from other players, and how you move in that environment with game controls. An interview conducted as a part of this research underlines the importance of exploration and control immersive qualities of a game. When a participant was asked if the mental charting of maps made the game more involving, they stated "Absolutely. 100%. Exploration is one of the things I enjoyed the most, outside the stories. They help me create my own stories" (p. 253). Although more research

outside of Calleja (2007, 2011) should be conducted on these two aspects, they can still be considered important immersive characteristics.

An important aspect of immersion in games that is not mentioned in Calleja's (2011) steps is the role of the avatar. The players' visual sense is embodied in the avatar, which Biocca (1997) noted as the primary sense that is used in virtual world embodiment. Wolfendale (2007) described how players become attached to their avatars, which can also be described as a higher level of immersion or embodiment. In addition, he mentioned that attachment to an avatar increases the enjoyment in an online community and is neither viewed as good or bad for the user. Avatar design is vastly important because it has a direct impact on game interaction and sets the communication tone for the environment (Kolko, 1999). In order to understand the process of embodiment in video games, the implications of the avatar have to be included.

In addition to the process of embodiment in video games, research suggests a unique limitation that keeps the practice at bay. Iacovides and Farrow (2013) argued that total embodiment is a fantasy and will never happen. This is due to technical limitations, where only the visual sense takes precedence (Biocca, 1997), but Iacovides and Farrow (2013) had an additional implication. They remarked that there needs to be a distance between the player and the actions of the game. In part, embodiment in games is created due to the lack of realism present (Iacovides & Farrow, 2013). People play games to escape the real world, not to embody another one. Iacovides and Farrow (2013) pushed game designers to focus on stories and interactions in games, rather than creating better graphics, which often promote a sense of realism that detours embodiment. With a newly attuned emphasis on these characteristics of immersion (Calleja, 2011; Herrewijn et al., 2000; Taylor, 2002) game designers may be able to produce a better gameplay experience. A

game looking to provide wonderful gameplay opportunities should prioritize story and player interactions above graphical prowess.

Player Motivations and Personalities

People are motivated to use media (television, film, etc.) for a variety of reasons, and video games are no different (Sherry, Lucas, Greensberg, & Lachten, 2006). Motivations in gaming can be defined as someone "deciding to spend time on online gaming rather than on, for example, television viewing, a hobby, school, or work (Jansz & Tanis, 2007, p. 133). Since video games are a relatively new medium, becoming more complex and popular by the year, motivations behind playing them have been recently analyzed. Sherry et al. (2006) were among the first researchers to have designed a systems model for video game use and effects. This model charted six characteristics for why people play games including arousal, challenge, competition, diversion, fantasy, and social integration. These factors are not game genre specific and apply to the medium as a whole. This is important to note due to the vast amount of literature that has been done in specific genres, in particular MMOGs.

It is possible that different game genres have unique player bases that are motivated for unique reasons (Williams, Yee, & Caplan 2008). For instance, first person shooter (FPS) players have been documented as being motivated by instant gratification and arousal from shooting virtual enemies and destroying the virtual environment (Jansz & Tanis, 2007). In comparison with massively multiplayer online games (MMOGs), which require a large time commitment and are often drawn out affairs, instant gratification and arousal are not key predictors in player motivation (Williams et al., 2008). A large amount of literature has been published on the latter of those two genres and will be the focus of this study.

Bartle (1996) was among the first researchers to develop a video-game player personality taxonomy in the MMOG genre. At the time, MMOGs were called MUDS or Multiuser Dimensions. These were largely text-only driven games on personal computers connected to the internet. Bartle argued that video game players take on personalities in the virtual worlds in which they participate. He theorized four personalities: achievers, explorers, socializers, and killers. Achievers focus primarily on accomplishing goals in the game, explorers are personalities eager to explore every inch of the virtual landscape, socializers are interested in socializing with other players, and killers are users who enjoy competition and winning against others.

Bartle's player taxonomy has been used in a variety of game studies (e.g., Williams et al., 2008) to discover what motivates players in virtual worlds. Bartle's model, however, was not developed using empirical data. This has kept the model from becoming concrete; so in 2006, Yee (2006) collected data from over 3,000 MMOG players through online surveys and found 10 significant motivations for gamers. He then organized these motivations under three distinct categories, or personalities: achievement, social, and immersion. Gamers with achievement personalities are interested in competition, acquiring gear for their avatar, and the game's mechanics among others. Gamers taking on social personas enjoy forging relationships in the game environment and general communication with other players. Those gamers who are immersion personalities favor role-playing, exploring the world, and customization. In order to discover what personality type a gamer is, a participant that scores high on "being part of a team" and "chatting with and getting to know other players" in Yee's survey, for example, would be described as having a social personality. Unlike Sherry et al.'s generalization of motivations to the entire medium, Yee's is focused on one particular genre using solely gamers as the sampling

pool. This model is currently being expanded upon by Yee and his associate Nicolas Ducheneaut to be utilized by gaming companies to understand gamers' motivations and personalities across genres (Yee & Ducheneaut, 2015).

Embodiment in Massively Multiplayer Online Games

Massively Multiplayer Online Games (MMOGs) are persistent online worlds that focus on social interaction to defeat computer-controlled bosses, trade virtual goods, and even kill one another. These games, which include titles like *EverQuest, Guild Wars, and World of Warcraft*, provide ample opportunities to study embodiment due to their direct focus on role-playing. Role-playing consists of a user taking on the aspects of an in-game character or avatar. Although it is possible to role-play in other genres, MMOGs are created with role-playing in mind (unlike a shooter like *Call of Duty* in which role-playing is not a marketed game feature). Role-playing characteristics include communicating in-character, creating a backstory for their avatar, and engaging other players in role-playing activities like battle reenactments. In addition to role-playing, MMOGs often present unrealistic experiences for a player to take on, like becoming a magic-wielding wizard or demon-summoning warlock. Williams et al. (2007) remarked that a "typical activity in MMOs involves a player trying to advance their avatar from an initial level of relation powerlessness to more advanced levels imbued with superhuman abilities and skills" (p. 429). According to Iacovides and Farrow (2013), this approach creates a separation between the game and the user, which leads to embodiment in games.

MMOGs are more than just fantasy worlds; they are places where people connect together and form relationships with one another. Williams, Ducheneaut, Xiong, Zhang, Yee, and Nickell (2006) investigated *World of Warcraft* and found that some players "considered connections in the game to be as real as any real life friendship" (p. 232). These in-game

relationships fulfill the shared involvement aspect of Calleja's (2011) Player Involvement Model. These players were possibly more immersed in the gaming experience, but other aspects of Calleja's (2011) model would have to be applied for this to be solidified (i.e., how immersed were these players through the story of the game). MMOG users do however, according to Williams et al. (2008), play for an immersive experience that provides social opportunity and achievement.

Levels of immersion could differ within games. In typical MMOGs, role-playing is optional on most "realms" or player worlds. Players can choose whether to partake in role-playing activities (talking in character, reenactments of in-game lore, etc.) or focus on non-role-playing activities (defeating bosses, collecting items, exploring, etc.). In the Williams et al. (2008) study on *EverQuest 2*, they mentioned that three out of twenty-five realms were role-playing focused. This means that the majority of realms and corresponding gamers are focused on other gameplay aspects, rather than role-playing. Since this is the case, it is difficult to generalize immersion. Williams et al. (2008) theorized that role-playing realms might consist of a population that is more immersed.

Even with a focus on role-playing realms, embodiment might be difficult to measure in MMOGs. Williams et al. (2006) noted that there are many situations where users can stop role-playing and be themselves. These moments include chatting with players that are not role-playing in order to communicate properly, interruptions in or out of game that takes the user out of the experience, and game environments that don't embrace role-playing (i.e., a guild or clan that excludes role-playing). The aspect of voice communication as outlined by Williams et al. (2007) could also have an impact on role-playing and embodiment where players use their real voices to express themselves.

Discovering the Virtual Fingerprint

Now that the literature of embodiment, immersion, and player motivations and personalities have been reviewed, a correlational analysis was utilized to discover the virtual fingerprint in MMOGs. Characteristics of Calleja's (2011) Player Involvement Model appear to line up with aspects of Yee's (2007) player personalities in MMOGs. The immersive qualities of Calleja's model textually align with the personalities articulated by Yee. For example, achievement personalities are motivated by figuring out the game's mechanics. The immersive quality of control and movement in the environment from Calleja's model appear to align with this motivation. The same could be said about chatting with and getting to know others for social personalities. The shared involvement factor of Calleja's model appears to fit well with this personality. Although Yee (2007) specifies that particular players play for immersive reasons, Calleja's model intersects all but one characteristic of Yee's inventory (see Table 1). Does the relationship between the two models go beyond textual similarity? If so, each player personality will have a distinct virtual fingerprint that will immerse them in a game. For example, an achievement personality under Yee's model could be immersed through a combination of emotions generated during gameplay, control and movement in the environment, and shared involvement. In addition, those that are found to be immersion personalities with a direct correlation to Calleja's model could be defined as the super-immersed or embodied. What follows are descriptions of Yee's player personalities, along with factors from Calleja's Player Involvement Model that may immerse them in the video game.

Table 1
Yee's (2007) Player Personality Inventory

Achievement	Social	Immersion
Leveling, acquiring great items, and becoming powerful (Emotions generated during gameplay)	Chatting with and getting to know other players (Shared involvement)	Exploring the world and knowing things (stories, locations of NPCs, etc.) that most other players don't know (Exploring the world, story elements)
Figuring out the game mechanics, planning a character's development, and optimizing a character (Control and movement in the environment)	Developing deep and meaningful relationships with other players (Shared involvement)	Role-playing and having interesting background stories for your character (Story elements)
Competing with other players in terms of combat, crafting ability, or the economy (Shared involvement)	Being part of a team (Shared involvement)	Customizing your characters to make them look distinctive, stylish and unique (Pursuit of goals and choices in the game)
		Escaping from the real world and leaving behind some real-life problems

Note. Yee's (2007) inventory that measures video game player motivations in MMOGs. In parenthesis are aspects of Calleja's (2011) Player Involvement Model that appear to align with the corresponding motivation characteristic.

Achievement Personalities

According to Yee's (2007) inventory, these players are primarily interested in three factors of a game. First, they are interesting in leveling their character and acquiring great in-game items, while in the process of becoming powerful. Second, they wish to figure out the game mechanics, plan a character's development, and optimize that character. Third, they want to compete with other players in combat, crafting ability, or economic means. Achievement personalities are invested in virtually becoming the best players in the game. They strive to accomplish any aspect of the game to their fullest potential. In an MMOG, this might mean

becoming the most accomplished in combat with other players or acquiring rare armor for their avatar that few others have.

With that in mind, elements from Calleja's (2011) Player Involvement Model related to control, emotions, and shared involvement may become evident. If an achievement personality is motivated by the mechanics of the game, then there is a possibility that control and movement in the environment will immerse them. The emotions generated from becoming powerful and among the most accomplished in the game may also impact how immersed they are. The inevitable interactions with other players through this process could be directly linked to shared involvement. With that being said, the following relationships between the two models have been hypothesized.

H1: There is a positive relationship between achievement personalities and control and movement in the game environment.

H2: There is a positive relationship between achievement personalities and emotions generated during gameplay.

H3: There is a positive relationship between achievement personalities and shared involvement.

Social Personalities

These players are interested in three factors of a game, mainly surrounding social interactions with others. First, they want to chat and get to know other players. Second, they strive to develop deep and meaningful relationships with these players. Third, they enjoy being part of a team, clan, or guild. Social personalities are motivated through the online interactions with others in the virtual world. In MMOGs, this is evident when players chat through in-game messaging systems with one another. A social personality is more invested in those conversations.

With that in mind, the characteristic of shared involvement from Calleja's (2011) Player Involvement Model may become evident. Developing relationships, being part of a team, and chatting with others are forms of shared involvement. Textually, no other immersive qualities align with Yee's (2007) social personality. A negative relationship between some of these factors may present themselves, however, in particular story elements and control and movement in the game. The depth and interest of the story in a game usually does not involve other players, and same goes for the controls and movement of the avatar. With that being said, the following relationships between the two models have been hypothesized.

H4: There is a positive relationship between social personalities and shared involvement

H5: There is a negative relationship between social personalities and story elements.

H6: There is a negative relationship between social personalities and control and movement in the game.

Immersion Personalities

These users are interested in becoming immersed in the game world. Immersion personalities are interested in exploring the world and knowing things that other players may not know. Second, they role-play and have interesting background stories for their characters. Third, they wish to customize their character and make them look stylish and unique. Fourth, they play to escape the real world and leave behind real life problems. These personalities enjoy a rich and engaging story, while developing their own narratives through their avatars. In MMOGs, this is evident when players partake in role-playing with one another. Often times, role-playing requires an in-depth understanding of the game's storyline, as well as having a developed plot line for an avatar.

With that in mind, elements from Calleja's (2011) Player Involvement Model related to exploration, story, and goals may become apparent. If exploring the world motivates an immersion personality, then they may be immersed by this same element in Calleja's model. Developing a backstory for an avatar is also a motivating factor and aligns well with the immersive characteristic of story elements. In addition, the customization of avatars is an important characteristic of these personalities, which could underline the immersive quality of choice and goals in the game. The diversity of immersive traits textually related to this personality could mean that they are the embodied population of the game. With that being said, the following relationships between the two models have been hypothesized.

H7: There is a positive relationship between immersion personalities and exploring the world.

H8: There is a positive relationship between immersion personalities and story elements.

H9: There is a positive relationship between immersion personalities and pursuit of goals and choices in the game.

Since these models are being correlated for the first time, it is possible that other relationships exist between the two. Characteristics of immersion that textually line-up with Yee's personalities may line-up in different ways than were originally hypothesized. The relative newness of these models also present some uncertainties.

RQ: What other relationships exist between Yee's personalities and Calleja's characteristics of immersion?

Method

Sampling and Procedure

To address the hypotheses and research question, human subjects approval was sought and obtained to survey a population of MMOG gamers through an online questionnaire on

Survey Monkey for three days. Although immersion can be measured objectively as well (Jennet et al., 2008), a survey provides ample flexibility when gaging the answers to these research questions. Since college students are no longer significant in generalizing research results in games (Williams et al., 2008), a broader range of participants was found by posting the hyperlink to the survey on MMOG online forums with a focus on role-playing subsections. This allowed for a direct analysis of gamers rather than a potluck of students who may or may not play video games. In addition, a survey of the MMOG community tested Williams et al.'s (2008) findings about the demographics of gamers and whether they have changed in the past eight years. This is important to note, especially if immersion and player personality has an association with demographical data.

In order to attempt to generalize the relation between characteristics of immersion and player personalities across the MMOG genre, it is important that multiple games be included. Three MMOG populations were targeted in this study through the corresponding games' online forums: *Guild Wars 2* (guildwars2.com), *Wildstar* (wildstargame.com), and *World of Warcraft* (worldofwarcraft.com). These games were chosen due to the ease of access for the researcher and diversity between the three titles. More information on these titles is included below.

World of Warcraft (WoW) has been the most popular pay-to-play MMOG for the last decade and has reached a peak 12 million subscribers. Pay-to-play games are similar to magazine subscriptions. Users pay a certain amount of money each month to access the game. A large amount of video game research in communication and other disciplines have used WoW as a focal point. It provides a large sampling size and a history of literature to go with it.

Guild Wars 2 is a buy then free-to-play MMOG and is a more modern title (released in 2012). Unlike subscription based MMOGs, *Guild Wars 2* users buy the game at retail price

(usually $60 at release) and do not have to pay a monthly rate to access it. The *Guild Wars* series has a rich fan base, and interest remains high with new content for players to experience coming every few months.

Wildstar is free-to-play MMOG that was released in 2014. Players pay nothing to access the game, but can purchase in-game items, power-ups, and character customization options using real currency. This payment model is among the most popular as of late, especially amongst new MMOGs. *Wildstar*'s fan base is the newest and smallest of the three titles, but provide unique access into a community that is in the initial stages of forming.

A total of 113 responses to the survey were fully completed. Of those respondents, 76.10% (n=86) of them were led to the survey from the *World of Warcraft* forum, 23.9% (n=27) came from the Guild Wars 2 forum, and no participants identified as coming from the *Wildstar* forum. Of the participants, 66.35% (*n*=69) were male compared to 33.65% (*n*=35) female. Of those that specified (*n*=98), the average age was 29.01. The ethnic background was largely Caucasian, (73.15%, *n*=79). A majority of respondents (70.57%, *n*=74) reported having some form of college education or are currently in college, and 58.17% (*n*=52) reported an annual income range of below $30,000, of which more than half (*n*=30) earned less than $10,000.

Measures

To address the hypotheses, the online survey included a selection of multiple-choice, scale, and comment box questions. To measure the demographics of MMOG users, a number of general questions were asked pertaining to age, sex, ethnicity, education, income, and gaming devices that they use for game play. Demographic results were compared to Williams et al. (2008) study to determine if there has been a change in the MMOG community over the last seven years. Although the sample size did not reach the 7,000 participants that were achieved in

the Williams et al. (2008) study, it is still important to keep tabs on the gaming community and to chart the demographics within it.

The first portion of the survey focused on player motivations in relation to immersion. Player motivations were determined using a refined version of Yee's (2007) player motivation inventory that was used in Williams et al. (2008). Participants were asked to use the 5-point rating scale created and used by Yee (2007) ranging from "Not Important at All "(1) to "Extremely Important" (5) to determine what characteristics of a game motivates them to play. This scale's validity was determined in a factor analysis by Williams et al. (2008) which successfully replicated the three personalities discovered by Yee (2007). Based upon what factors participants rated high or low, they were placed into the corresponding personality category as outline by Yee (achievement, social, or immersion). Calleja's (2011) characteristics of immersion were added to the measure using the same scale by asking participants which factors of immersion they find important in the gaming experience. If player motivation and immersion correlate, ratings between them should be similar. For example, if "chatting with and getting to know other players" is rated as "extremely important (5)" on Yee's player motivation inventory, then "shared involvement" of Calleja's model will rate high. The data collected from this portion of the survey was used to uncover the existence of the digital fingerprint.

Results

To explore the association between player personalities and factors of immersion, a correlational analysis was conducted between the two models. A factor analysis was conducted to determine player personalities and what immersive properties they correlated to. Three factors were found, which confirms the personalities discovered by Yee (2007). The first factor related

to achievement personalities the second related to social personalities, and the third related to immersion personalities. The results are separated by player personality.

Achievement Personalities

The results indicate that achievement personalities are positively related to control and movement in the environment ($r = .27$, $p < .01$), shared involvement ($r = .37$. $p < .01$), and pursuit of goals and choices in the game ($r = .38$, $p < .01$). This indicates that H1 and H3 were supported. H2, which predicted emotions generated during gameplay would be correlated to achievement personalities, was not significant ($r = .13$), failing to support this hypothesis. The pursuit of goals and choices in the game was a factor that was not a hypothesized correlation, but found significant.

Social Personalities

The results indicate that social personalities are positively related to shared involvement ($r = .47$, $p < .01$), confirming H4. Story elements ($r = .13$), and control and movement in the environment ($r = .06$) were not significant, supporting H5 and H6.

Immersion Personalities

The results indicate that immersion personalities are positively related to exploration of the world ($r = .53$, $p < .01$), shared involvement ($r = .32$, $p < .01$), story elements ($r = .49$, $p < .01$) and emotions generated during gameplay ($r = .40$, $p < .01$), confirming H7 and H8. H9, which predicted that the pursuit of goals and choices would have a positive relationship, was not significant ($r = .18$), failing to support this hypothesis. Emotions generated during gameplay was a factor that was not a hypothesized correlation, but found significant.

Discussion

This research sought to discover how gamers identified as exhibiting one of Yee's (2007) player personality types become immersed in MMOGs. Factors of Calleja's (2011) player involvement model, which depicts the immersive characteristics of a video game, were found to align with particular personalities. The correlation between these two models is significant-a virtual fingerprint has been uncovered for each personality. A discussion about each player personality, what immerses them, and their proposed fingerprint is described below. Implications of these findings for the typical player and game companies are also discussed. To address the research question (RQ), additional relationships between the two models are specifically addressed in each player personality section. A discussion about the demographics of this study concludes the section.

Fingerprint for Achievement Personalities

Achievement personalities want to become the best players in the video game environment. They seek out optimizing and leveling their character to their highest potential, while also competing with others for dominance in the virtual space. Based on this study, achievement personalities are more immersed in gaming experiences that include significant control and movement in the environment, shared involvement, and the pursuit of goals and choices in the game. Two of these immersive characteristics were hypothesized to be correlated to the personality (control and movement; shared involvement), while pursuit of goals and choices was an additional related quality. Emotions generated during gameplay was not significant to this personality as originally hypothesized.

The addition of goals and choices to this fingerprint holds significance to those with achievement personalities. If these players are indeed aiming to achieve the chief aspects of the

game, there are a number of goals and choices that require their attention. These players' goals could include acquiring a rare item for their character or becoming the wealthiest armor crafter in the game. The concept of completing a goal is an achievement in and of itself. With this feeling of accomplishment present, it is somewhat surprising that emotions generated during gameplay were not found significant to this fingerprint.

With the idea that these personalities enjoy competition, and becoming powerful, why isn't emotion a key immersion trait for achievers? Defeating another player in a hard-fought battle or finally acquiring that all-powerful weapon from a boss would certainly spark some edge of emotion. These emotions might include excitement, relief, or even sadness when not accomplishing an element of the game. When considering this result, the wording of the survey questions becomes a possible influence. The words "powerful" and "competing" (achievement personality characteristics) have significant strength, whereas "emotions" (immersion quality) has a variety of meanings.

Shared involvement and control and movement in the environment were also significantly correlated to achievers. Shared involvement was a significant determinant of immersion among all three personalities. Since this study was done using MMOG players as participants, this isn't relatively shocking due to the online nature of the genre. MMOGs often times require significant interaction between other players, and if a player wishes to achieve the highest aspects of the game, there is virtually no way around it. This is particularly the case when competing with others, in which interaction is inevitable. Although the meaning of shared involvement may differ between personalities (i.e., combat for achievers v. chatting with others for those with social personalities), it continues to be a key immersive quality for these gamers as originally outlined by Calleja (2011).

Control and movement in the environment is a bit more technical and "hands-on" than the other immersive qualities of achievers. The mechanics and the rules of the game have a significant impact on this characteristic. For example, an achiever might find the size of the virtual world important–is the environment constricted? Is large enough to properly develop a character? In addition, the controls of the game itself have a direct impact on immersion. The controls have to align with a player's preference. MMOG developers have recognized this by enabling the ability to have player-unique user interfaces, key-bindings (hotkeys), and other mechanics that can be customized.

Fingerprint for Social Personalities

Social personalities are focused primarily on the numerous social aspects of a video game including building relationships, chatting with others, and being a part of a team. Based on this study, it was discovered that these personality types are immersed through the shared involvement with other players in the game. As hypothesized, this was the only immersion trait that was found significant with this personality. As discussed earlier, MMOGs put interactions between players as a center-point of the genre. Interactions can vary from the passive (simply being in the online virtual world) to the aggressive (combat with others). Gamers with social personalities may become more immersed when they join a guild (a group of organized players) and make a number of online friends.

Since only one factor of immersion had a significant relationship with social personalities, this brings to question whether or not there is more to this fingerprint. The other two personalities had additional qualities that were found outside the original hypotheses, whereas the social personality did not correlate with any other characteristics as identified by

Calleja (2011). It could be that shared involvement carries a variety of meanings depending on the player personality. This factor has a broad expanse, being significant between all three personalities, while being based upon different personality traits.

Fingerprint for Immersion Personalities

Immersion personalities are motivated to play in the virtual world by exploring it, role-playing, customizing their character, and escaping reality. It was found that these personalities become immersed by exploring the world, story elements, emotions generated during gameplay, and shared involvement with other players. Two of these immersive characteristics were hypothesized to be correlated to the personality (exploration and story elements) while shared involvement and emotions were additional related qualities. The pursuit of goals and choices in the game was not found to be a significant immersion factor.

Immersionists become immersed through a variety of characteristics in the game–these individuals are the most diverse out of the three personalities. Since this study measured factors of immersion, it comes as little surprise that personalities based upon the term *immersion* are engrossed through four of the six factors outlined by Calleja (2011). Out of those four immersion characteristics, three are strictly based in Yee's (2007) player personality category, making this fingerprint well-defined and unique. These personalities are immersed in a variety of ways, which could underline the importance of embodiment among this population of players. Immersionists become significantly captivated in the game through story elements. A game that has a more complex and in-depth story may be more immersive than that of one with a basic linear plot. From the participants in this study, many play or have played *World of Warcraft* and/or *Guild Wars 2*, both lore centric universes with a series of compelling story lines. Include

player driven stories to the mix from role-playing or customizing a character's look, and this becomes an incredibly deep experience for these personalities.

A deep story often provokes a series of emotions, which was also found to be significant for immersionists. As mentioned previously, particular emotions were not detailed in the questionnaire, but usually stories present positive and negative connotations of the term emotions. *World of Warcraft* has numerous plot lines, some which end in the death of fan-favorite characters, to stories of enlightenment. For instance, immersionists may feel sad when a main character dies or happy when one is empowered in the universe. A social personality may not feel any sort of emotion when these events take place or at the very least, not become immersed by it.

Again, shared involvement had a significant impact on a personality. When it comes to immersionists, shared involvement may take priority in the role-playing experience. Often times, role-playing is not done alone but rather with other players with similar backstories. Particular guilds or clans focus solely on role-playing and have elaborate living story arcs for their followers. These players will utilize in-game chat functions by talking in-character, or how that character may converse in the game universe.

Surprisingly, the pursuit of goals and choices in the game was not found to be significant. Focusing mainly on the term *choices*, the character customization and creation of backstory for individual characters represents just that. When it comes to goals, it may be the case that immersionists have only one goal in mind: becoming immersed. This is evident with the significance that escaping from the real world had on these personalities. With this and other factors of the personality in mind, immersionists may represent the embodied population of the game.

This personality is diverse in factors of immersion that could lead to full embodiment. Although more clarity needs to be reached, in particular with the factors of emotion and shared involvement, it could be safe to say that the immersionist fingerprint is the most in-depth. These players are immersed in a variety of ways and could be the most engrained in the game. When studying the communication directly with a video game, immersionist personalities could offer great insight to this process.

Implications for the Developer and Player

The discovery of the virtual fingerprint has direct implications for video game developers and individual players. The findings suggest that particular gamer personalities become immersed in unique ways. First and foremost, game developers can use this information to tailor-make game experiences for each or select personalities by using virtual fingerprints. For instance, if a developer wishes to make an in-depth social driven virtual world, they could focus on attracting social personalities (immersed by shared involvement). Virtual fingerprints create in-depth player target markets that go beyond general demographical data. In MMOGs, this information could be of importance for those developers that are looking to retain or grow their player population.

MMOGs are persistent online worlds that often times require an active player population to exist and thrive. If a game developer discovers what personalities are being attracted to the game (or being turned away from it), they can use that information to make a more immersive and attractive game experience for their in-depth player target market. In addition, game developers may enhance relations with their player base through this process. Understanding what motivates and immerses players, developers may be able to communicate better with their player base as inevitable changes are made to the game. For example, this communication might

include changes to the social structure of the game (interest to social personalities), updates the storyline (interest to immersionists), or a new combat system between players (interest to achievers). MMOG worlds are rarely static and go through a series of changes in their lifetime. Being able to better communicate these changes is of benefit to both developers and players.

Understanding the virtual fingerprint is just as important to players as it is for developers. Developers can enhance and build better virtual worlds, whereas players can seek out the ones that fit their personality. In other words, players can become better informed about which games they choose to consume. At the moment, when consumers choose a new game to buy, they may be presented with information such as genre, overview of game systems, and graphical screenshots of the virtual world. Although this general information does highlight some aspects of player personalities, it doesn't provide enough in-depth details to make a solid selection. This becomes particularly potent for personalities who become immersed through shared involvement. Getting a true feeling of how much shared involvement is in the game is difficult to judge from a basic game overview; this could be alleviated by utilizing the virtual fingerprint. In addition to the general overview, a developer could mark the game with a recommended virtual fingerprint. For example: *"This game is highly recommended for social personalities."* This simple statement provides more information to the gamer, while also fulfilling the target market that the game developer wishes to tap into. This recommendation system would need further refining, but could represent the next generation of game rating systems. Quantic Foundry (2015) has already developed a player motivation profile for gamers to use to determine their motivations to play, but factors of immersion could be added for a more detailed approach.

Demographic Implications

The demographic results in this study is further evidence that gamers are no longer holding true to the stereotype of young teenagers (Williams et al., 2008). The average age of the participants was found to be 29.01 years old, and largely Caucasian at 73.15%. It is important to understand that the virtual fingerprints in this study were designed using this younger white population. Although the correlations in this study were found significant, the diversity of the player base itself is lacking. Previous demographics research by Williams et al. (2008) of 7,000 gamers had the same issue: a largely white and younger middle-aged population. The factors of immersion (Calleja, 2011) and player personalities (Yee, 2007) do not consider the age and race of the game player in their equations. On the surface, this may not have an impact, but given how new this research is, it very well could.

Another demographic finding that was significant was the average income range of the participants. Of those that reported this information, 35.29% had annual income ranges bellow $10,000. Given this statistic, over a third of the participants are below many U.S. State poverty lines. Although this study did not focus on income, this is important to recognize. If considering the definitions of immersion and embodiment as becoming "lost in the virtual world" in some way shape or form, it could be that these lower income populations are more eager to do so. Escaping the real-life stresses of low income to become a rich merchant in an online world could fulfill a basic need. With computers and gaming devices becoming more affordable, and easy to access, the idea of these lower income gamers is not too farfetched.

If these income results remain static across future studies, other research could explore additional implications surrounding these players. If lower income players are more likely to become immersed, how does this impact their overall wellbeing? Aspects of general health and

livelihood could be explored here. More information needs to be gathered when addressing these incubations, but they highlight a possible negative side effect to deep levels of immersion.

Limitations

The discovery of the virtual fingerprint holds immense possibility for game designers and players alike. Since this is a new concept, it holds a series of limitations that could be alleviated from future research, including building gamer personalities further and what immerses them. The personalities used in this study were originally developed by Yee (2007), which is considered recent research and subject to change. In fact, Yee and Ducheneaut (2015) are in the process of refining these personalities and what motivates players to play, including new motivations like "destruction" and "strategy." Through their individual consulting firm Quantic Foundry, they have gathered data and created over 220,000 gamer motivation profiles available to purchase for game developers. As their research finalizes, it will be important to incorporate their findings in future endeavors on virtual fingerprints. Again, this is a new concept, in a relatively new entertainment media that will require refinement as changes occur in gaming.

Virtual fingerprints provide information for those who wish to play or design MMOGs. The personalities and immersion factors that were applied in this study were designed using strictly that genre. It is important to note that MMOGs are only one of many genres of games, but communication research in gaming, as well as research in other disciplines, has focused heavily on this game context. The player interactions with and within these role-playing virtual worlds only represent 9.5% of the top-selling video games by genre in 2014 (Entertainment Software Association, 2015). According to the Entertainment Software Association (2015), no MMOG made the top-20 selling video games list in 2014. Top selling genres include action titles (*Grand Theft Auto 5*), shooters (*Call of Duty*), and sports titles (*Madden NFL 15*).

Expanding the virtual fingerprints in this research to other genres is to be cautioned. Although some personality or immersion elements may remain stagnant, others could change.

This focus on the MMOG genre is a limitation not only to this study, but to communication games scholarship in general. These virtual worlds provide ample opportunity to study computer-mediated communication in gaming, but to generalize the results in this study to gaming as a whole should be avoided until future research is completed. The virtual fingerprints in the MMOG genre may vary from those in first person shooter games. This can be compared to movie genres: an assumption cannot be made that everyone who enjoys romantic comedies will love horror films. The same concept should be applied to gaming research.

Although virtual fingerprints were uncovered, the sample size (n=116) for this study was small given the overall population of the games this study focused on. In addition, a majority of participants came from *World of Warcraft* (n=86) in comparison to the other two games included in this study. Significant relationships were found, but with more data these fingerprints could become further refined and generalized. Terminology could also be improved when asking participants about shared involvement and emotions generated during gameplay. Each fingerprint had shared involvement as an immersion factor, but it's probable that the interpretation of this term is different for each personality. Emotions generated could be clarified as well to include specific emotions such as sadness, happiness, etc. Applying these changes could assist the refining process of the virtual fingerprint concept.

Future Research

As stated in the limitations, it is important that virtual fingerprints continue to be refined through future testing. Further clarification of each virtual fingerprint should be completed in the MMOG genre before expanding the concept further. Since this was a quantitative study, it

would be interesting to see how this concept could be applied qualitatively. Detailed interviews with players might provide further insight on the concepts discussed in this study. These personalities and immersion qualities have not been applied to qualitative methodology and could provide new insights for researchers.

When testing and refining these virtual fingerprints in the future, the immersion factors of shared involvement and emotions generated during gameplay should be more clearly defined. For example, emotions could be stated as *generates a feeling of sadness while playing* or *generates a feeling of excitement*. Shared involvement could be stated as *shared involvement through completion* or *shared involvement through developing relationships*. These textual differences would bring more detail to the how different personalities become immersed. This is critical for shared involvement, a quality each personality shares.

From the game developer's perspective, it would be important to understand whether or not aligning games with particular virtual fingerprints will equal more profit. For instance, is it worth the resources to market a game for a particular virtual fingerprint? This is a question that would need assistance from game companies, who in the past have been uneager to work with academic focused researchers (Williams et al., 2008). In addition, literature background would have to be acquired about what makes a game profitable before moving on with this expanse of virtual fingerprint research.

In addition, a developer may want to adjust their game to fit the majority of personalities that play it. For instance, if an MMOG consists primarily of achievement personalities, developers may want to include more control and movement customizations. Once shared involvement is better defined as an immersive quality, the same holds true for social

personalities–a developer may wish to create more social experiences for their players. Developers who better understand their player base may be able to create a better game.

From the game player's perspective, it would be fascinating to discover whether or not a gamer has a better gameplay experience as a whole when aligning their virtual fingerprint with a corresponding title. For example, does an immersion personality have a better gameplay experience playing an immersionist centered title, over one that is not? Based upon initial judgment, the answer would appear to be yes, but positive or negative feelings of gameplay might be measured differently. Once these virtual fingerprints are further refined, this is an area of exploration that could be further examined.

The data collected on income ranges in this study was briefly touched on but should be explored further. Based on the low-income status of most of the participants, it begs the question whether or not these players strive to become more immersed in the virtual world. This could have significant implications for both players and developers alike. Developers of MMOGs may wish to pursue free-to-play options, where spending power is not a centerpiece of play. This would open up the market to these low-income gamers. Many MMOGs are already following this route, moving away from monthly subscriptions and expansion sets that range from $40.00 to $60.00. The trend may continue if future research continues to report low annual income for more than half its participants.

The research on video game immersion, embodiment, and player personalities is still relatively new. This study pushed these concepts further and found correlations between characteristics of immersion and player personalities, ending in the discovery of three different virtual fingerprints. Although still in its infancy, these fingerprints can be utilized by game developers and players alike to better comprehend the gaming experience. As technology

continues to advance, in particular with virtual reality, understanding how and why people become immersed in virtual worlds becomes more evident.

References

Bartle, R. (1996). Hearts, clubs, diamonds, and spades: Players who suit MUDs. *The Journal of Virtual*

Environments, 1(1). Retrieved March 1, 2015, from http://mud.co.uk/richard/hcds.htm

Biocca, F. (1997). The cyborg's dilemma: Progressive embodiment in virtual environments [1]. *Journal of Computer-Mediated Communication, 3*(2). Retrieved March 1, 2016, from doi:10.1111/j.1083-6101.1997.tb00070.x

Brown, E., & Cairns, P. (2004). A grounded investigation of game immersion. *CHI '04 Extended Abstracts on Human Factors in Computing Systems, 1(1)*, 1297-1300.

Calleja, G. (2007). Digital game involvement: A conceptual model. *Games and Culture, 2*(3), 236-260. doi:10.1177/1555412007306206

Calleja, G. (2011). *In-game from immersion to incorporation*. Cambridge, MA: MIT Press.

Entertainment Software Association (Ed.). (2015). Essential facts about the computer and video game industry 2015. 1-16. Retrieved February 28, 2016, from http://www.theesa.com/wp-content/uploads/2015/04/ESA-Essential-Facts-2015.pdf

Entertainment Software Rating Board. (2010). Video game industry statistics. Retrieved November 22, 2014, from http://www.esrb.org/about/video-game-industry-statistics.jsp

Garau, M., Slater, M., Vinayagamoorthy, V., Brogni, A., Steed, A., & Sasse, A. (2003). The impact of avatar realism and eye gaze control on perceived quality of communication in a shared immersive virtual environment. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems,* 529-536. ACM Press, 2003.

Gee, J. P. (2008). Video games and embodiment. *Games and Culture, 3*(3-4), 253-263. doi:10.1177/1555412008317309

Herrewijn, L., Poels, K., & Calleja, G. (2000). The relationship between player involvement and immersion: An experimental investigation. *The Modern Language Journal, 84*(1), 5-27.

Iacovides, I., & Farrow, R. (2013). Gaming and the limits of digital embodiment. *Philosophy & Technology, 27*(2), 221-233. doi:10.1007/s13347-013-0111-1

Jansz, J., & Tanis, M. (2007). Appeal of playing online first person shooter games. *CyberPsychology & Behavior, 10*(1), 133-136. doi:10.1089/cpb.2006.9981

Jennett, C., Cox, A. L., Cairns, P., Dhoparee, S., Epps, A., Tijs, T., & Walton, A. (2008). Measuring and defining the experience of immersion in games. *International Journal of Human-Computer Studies, 66*(9), 641-661. doi:10.1016/j.ijhcs.2008.04.004

Kolko, B. E. (1999). Representing bodies in virtual space: The rhetoric of avatar design. *The Information Society, 15*(3), 177-186. doi:10.1080/019722499128484

Morris, C. (2015, June 24). Virtual reality is set to go mainstream. Retrieved October 17, 2015, from http://www.cnbc.com/2015/06/24/virtual-reality-is-about-to-go-mainstream.html

Sherry, J., Lucas, K., Greenberg, B., & Lachlan, K. (2006). Video game uses and gratifications as predictors of use and game preference. *Playing video games: Motives, responses, and consequences,* 24(1)*,* 213-224.

Taylor, T. (2002). Living digitally: Embodiment in virtual worlds. In R. Schroeder (Ed.), *The social life of avatars: Presence and interaction in shared virtual environments*, 40-62, London: Springer.

Williams, D., Caplan, S., & Xiong, L. (2007). Can you hear me now? The impact of voice in an online gaming community. *Human Communication Research, 33*(4), 427-449. doi:10.1111/j.1468-2958.2007.00306.x

Williams, D., Ducheneaut, N., Xiong, L., Zhang, Y., Yee, N., & Nickell, E. (2006). From tree house to barracks: The social life of guilds in World of Warcraft. *Games and Culture, 1*(4), 338-361. doi:10.1177/1555412006292616

Williams, D. (Producer). (2013). *USC Annenberg faculty - Dimitri Williams* [Video file]. Retrieved November 22, 2014, from http://annenberg.usc.edu/Faculty/Communication%20and%20Journalism/WilliamsD.aspx

Williams, D., Yee, N., & Caplan, S. E. (2008). Who plays, how much, and why? Debunking the stereotypical gamer profile. *Journal of Computer-Mediated Communication, 13*(4), 993-1018. doi:10.1111/j.1083-6101.2008.00428.x

Wolfendale, J. (2007). My avatar, my self: Virtual harm and attachment. *Ethics and Information Technology, 9*(2), 111-119. doi:10.1007/s10676-006-9125-z

Yee, N., & Ducheneaut, N. (2015). Quantic foundry. Retrieved March 1, 2015, from http://quanticfoundry.com/

Yee, N. (2006). The demographics, motivations, and derived experiences of users of massively multi-user online graphical environments. *Presence: Teleoperators and Virtual Environments, 15*(3), 309-329. doi:10.1162/pres.15.3.309

Yee, N. (2007). Motivations for play in online games. *CyberPsychology & Behavior, 9*(6), 772-775. doi:10.1089/cpb.2006.9.772

APPENDIX

Appendix A:

Immersion and Motivation Measures

Instructions: Use the provided scale to determine the importance of the following gaming characteristics to you. Enter one number before each statement to indicate your feelings.

1	2	3	4	5
Extremely Unimportant	Somewhat Unimportant	No Impact	Somewhat Important	Extremely Important

1. ____Leveling, acquiring great items and gear, and becoming powerful.

2. ____Figuring out the game mechanics, planning my character's development, and optimizing my character.

3. ____ Competing with other players in terms of combat, crafting ability, or the economy.

4. ____ Chatting with and getting to know other players

5. ____ Developing deep and meaningful relationships with other players.

6. ____ Being a part of a team.

7. ____ Exploring the world and knowing things (stories, locations of NPCs, etc.) that most other players don't know about.

8. ____ Roleplaying and having interesting background stories for your character.

9. ____ Customizing your characters to make them look distinctive, stylish, and unique.

10. ____ Escaping from the real world and leaving behind some real-life problems and worries

11. ____ Control or movement in the environment

12. ____ Exploration of the world

13. ____ Shared Involvement

14. ____ Story Elements

15. ____ Emotions generated during gameplay

16. ____ Pursuit of goals and choices in the game

Appendix B:

Demographic Survey Questions

Instructions: Please select the answer that best applies to you.

1. What is your age? _____

2. What is your sex?

   - o Male
   - o Female
   - o Other

3. What is your ethnicity?

   - o Caucasian
   - o African-American
   - o Asian
   - o Latino
   - o Other (Please Specify) _____

4. What is your highest level of education?

   - o <High School
   - o High School Diploma
   - o Some College
   - o College Graduate
   - o Post-Graduate Studies
   - o Doctoral

5. Please specify your annual income range.

   - o <$10,000
   - o $10,000-$19,000
   - o $20,000-$29,000
   - o $30,000-$39,000
   - o $40,000-$49,000
   - o $50,000-$59,000
   - o $60,000-$69,000
   - o $70,000+

6. What device(s) do you currently play video games on? Select all that apply.

   - o PC/Mac
   - o Console (PlayStation, Xbox, and/or Wii)
   - o Mobile Phone
   - o Portable Gaming Device (PSP/Vita, Nintendo DS/3DS)
   - o Other (Please Specify) _____

7. What device do you play video games on the most?

- o PC/Mac
- o Console (PlayStation, Xbox, and/or Wii)
- o Mobile Phone
- o Portable Gaming Device (PSP/Vita, Nintendo DS/3DS)
- o Other (Please Specify) _____

8. What voice communication service do you use the most when playing PC games?

- o TeamSpeak
- o Ventrillo
- o Mumble
- o Raid Call
- o Skype
- o None
- o Other (Please Specify) _____

9. When using voice communication in games, who do you speak to? Select all that apply.

- o Real-Life Friends
- o Online Friends
- o Strangers
- o None
- o Other (Please Specify) _____

10. Which gaming outlet led you to this survey?

- o Guild Wars 2
- o Wildstar
- o World of Warcraft
- o None of the Above

Appendix C:

Human Subjects Approval Letter

UHSRC Determination: EXEMPT

DATE: April 10, 2015

TO: Benjamin Bower
Department of CMT
Eastern Michigan University

Re: UHSRC: #735958-1
Category: Exempt category 2
Approval Date: April 10, 2015

Title: The Process of Embodiment in Video Games

Your research project, entitled **The Process of Embodiment in Video Games**, has been determined **Exempt** in accordance with federal regulation 45 CFR 46.102. UHSRC policy states that you, as the Principal Investigator, are responsible for protecting the rights and welfare of your research subjects and conducting your research as described in your protocol.

Renewals: Exempt protocols do not need to be renewed. When the project is completed, please submit the **Human Subjects Study Completion Form** (access through IRBNet on the UHSRC website).

Modifications: You may make minor changes (e.g., study staff changes, sample size changes, contact information changes, etc.) without submitting for review. However, if you plan to make changes that alter study design or any study instruments, you must submit a **Human Subjects Approval Request Form** and obtain approval prior to implementation. The form is available through IRBNet on the UHSRC website.

Problems: All major deviations from the reviewed protocol, unanticipated problems, adverse events, subject complaints, or other problems that may increase the risk to human subjects or change the category of review must be reported to the UHSRC via an **Event Report** form, available through IRBNet on the UHSRC website

Follow-up: If your Exempt project is not completed and closed after **three years**, the UHSRC office will contact you regarding the status of the project.

Please use the UHSRC number listed above on any forms submitted that relate to this project, or on any correspondence with the UHSRC office.

Good luck in your research. If we can be of further assistance, please contact us at 734-487-3090 or via e-mail at human.subjects@emich.edu. Thank you for your cooperation.

Sincerely,

Alissa Huth-Bocks, Ph.D.
Chair CAS
Human Subjects Review Committee