

## The Role of Presence in the Experience of Electronic Games

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In the 1982 movie *Tron*, a computer-game designer named Kevin Flynn (Jeff Bridges) is literally zapped into the electronic game world he created. In this environment, he gets to play his imaginative computer games as if they were real. To many viewers at the time, the scenario envisioned by *Tron* might have been nothing more than an outlandish fantasy (which could explain the film's lack of box office success), but *Tron* has become a cult classic to many gaming enthusiasts, who applaud the film for realizing their dream of becoming totally "immersed" in the world of electronic games (Demaria & Wilson, 2002). When *Tron* was released in 1982, electronic games were in their infancy and had very limited potential to make players feel like they were engaging in real experiences. But due to the phenomenal advancements that have occurred in electronic-game technology over the past 20 years, the dream of *Tron* has almost become a reality. Many games are now being designed to create a sense of "being there" inside the game world, a feeling we call *presence*.

Presence is a relatively new concept, but its emergent academic importance is hard to overlook. It has captured the attention of philosophers, psychologists, computer scientists, and engineers along with experts from related fields. And although it has been largely overlooked by entertainment researchers, its application here is difficult to ignore. Presence can be understood as a critical concept in several areas of entertainment theory, with particular relevance to the type of interactive entertainment found in electronic games (Klimmt & Vorderer, 2003; Tamborini, et al., 2004). Moreover, developing trends in electronic-game technology seem directly related to central dimensions of presence. Realistic graphics and sounds, haptic feedback, first-person point of view, and control devices that map natural body actions all increase the vividness and interactivity in games making them highly conducive to the sensation of presence. Presence seems central in shaping the experience of electronic games.

We begin this chapter by defining the concept of presence. Then, we provide a more detailed discussion of how developments in game technology are related to three dimensions of presence: spatial presence, social presence, and self-presence. Finally, we argue that changes in

presence corresponding with technological advances not only affect electronic game use, but also shape user experiences that govern the development of mental models and other outcomes of exposure.

## DEFINING PRESENCE

Explaining people's experience with media has captivated the attention of scholars from fields concerned with the development of media technology to those focused on how humans interact with this technology. Until recently, media scholars did little more than acknowledge that the manner in which we experience media is important. No major undertakings described or defined the essence of media experience. This changed, however, when recent advances in "virtual reality" (VR) increased our need to distinguish experiences in virtual environments (those that can only be experienced by technology) from actual environments (those that can be experienced without technology). With technology's promise to blur the distinction between the actual and the virtual to a point where we can no longer take for granted our ability to separate the two, researchers are forced to consider subtle differences in the complex process of media experience. Although VR was once a term reserved for futuristic goggles and gloves technology, today's electronic games create virtual environments where users interact in ways hard to distinguish from interaction in actual worlds. Considerations of these subtle differences in experience are the focus of presence research.

Since Reeves (1991) directed scholarly attention to the feeling of "being there" created by media technologies, attempts to define this experience and identify its determinants have proliferated. Unfortunately, like many highly abstract concepts, efforts to develop a shared understanding of presence and its corollaries suffer from the use of different terms referring to identical concepts or use of the same term to mean slightly different things. Words like presence, telepresence, subjective presence, virtual presence, and others are used interchangeably to distinguish experience in virtual environments (Tamborini, 2000). Yet although the terminology found often differs, there is general agreement about the concept they are trying to represent. In simple and somewhat limited terms, the essence of presence is often described as the perception of nonmediation (Lombard & Ditton, 1997).<sup>1</sup> In this sense, presence can be understood as a psychological state in which the person's subjective experience is created by some form of media technology with little awareness of the manner in which technology shapes this perception.

Although definitions of presence are still muddled by its application in different areas of study, there seems to be general agreement that it is a multidimensional concept. In their seminal work reviewing presence in different literatures, Lombard and Ditton (1997) identified six conceptualizations including presence as social richness, presence as realism, presence as transportation, presence as immersion, presence as social actor within a medium, and presence as medium as social actor.<sup>2</sup> Current conceptualizations of presence generally offer typologies identifying different dimensions of presence based on domains of experience. Although different typologies have been provided to classify categories of presence (e.g., Biocca, 1997; Heeter, 1992; Lee, 2004), most schemes share certain categories in common. *Spatial presence*, *social presence*, and *self-presence* emerge prominently in this literature. We will consider the relationship of electronic games to presence in terms of these three dimensions.

Spatial presence might be understood as the sense of being physically located in a virtual environment (Ijsselstein, de Ridder, Freeman, & Avons, 2000) or experiencing virtual physical objects as though they are actual objects (Lee, 2004). Social presence can be thought of as the experience of virtual social actors as though they are actual social actors (Lee, 2004). Finally, self-presence has been defined as a state in which users experience their virtual self

as if it were their actual self (Lee, 2004), perhaps even leading to an awareness of themselves inside a virtual environment (Biocca, 1997). Although each dimension has notable implications for understanding experience in electronic games, the concentration of research on spatial presence shows its particular importance. Focus on spatial presence seems to parallel early developments in electronic game technology designed to create a sense of "being there" and reveals the importance of spatial presence for examining outcomes from electronic-game play.

## **SPATIAL PRESENCE: BEING THERE IN ELECTRONIC GAMES**

When Kevin Flynn enters the computer game environment in *Tron*, he moves through the virtual world as if he were interacting with the actual world. He jumps on a light-cycle, grabs its controls, and speeds his way around a virtual landscape and across the game world he perceives. Although his initial experience is shaped by an acute awareness that the objects and entities he encounters are virtual, he quickly begins to treat these virtual things as though they are actual and starts to respond as someone actually "there" in the game world. The extent to which game players feel transported to another place, as though they are physically located inside the virtual environment, can be understood as the extent to which they experience spatial presence.

Spatial presence (and related terms such as physical presence, subjective presence, and telepresence) has been identified as a critical determinant of an electronic game's affect on users. Tamborini (2000) argued that the strength of an electronic game's influence is determined by the game's ability to enhance two essential qualities of spatial presence: the feelings of *involvement* and *immersion*. He suggested that technological features associated with *interactivity* and *vividness* inherent in most electronic games heighten the user's sense of involvement with and immersion in the virtual game environment, a process Wirth et al. (2003) explained in terms of mental models. Wirth et al. argued that situational mental models of environments are pre conditions for spatial presence. They think of spatial presence as primarily a cognitive experience. Although sensory cues can enhance the perception of spatial presence, cognitions more than cues govern this experience. People construct models of environments from the spatial cues they perceive and their memories of the spatial environment. As such, experiences of spatial presence vary from high to low as a function of individual differences in perceptions and memories (Ijsselstein et al., 2000) as well as characteristics of form and content found in particular media (Lombard & Ditton, 1997).

### **Vividness, Interactivity, and Spatial Presence in Electronic Games**

Vividness refers to the technology's ability to produce a rich sensory environment (Steuer, 1992) and is defined by the manner in which information is presented to the senses. A vivid technology is high in breadth (the number of sensory channels simultaneously activated) and depth (the degree of resolution within each sensory channel). Conventional media like radio and television have somewhat limited breadth, sending signals to only the auditory and/or visual channels. Newer electronic games supplement this by adding input to haptic and orienting systems (those controlling body equilibrium), often providing simultaneous cross-model forms of redundant information by activating multiple sensory systems in ways that heighten spatial presence (Biocca, Inoue, Lee, Polinsky, & Tang, 2002). For example, a player swerving onto a rumble strip in a driving game might be met with thumping sounds plus vibrations in the

game controller that match feelings in real life. The burgeoning area of haptics technology focuses on how game controllers can impart force and vibrations in response to on-screen actions — something already present in most newer game controllers and expected to be more prevalent in coming years due to advances in the understanding of neurology (Kushner, 2003). In cases of feedback to multiple sensory systems, VR technology allows user expectations based on efferent sensation to be met by afferent feedback. Thus, for example, when a player in a VR game environment turns his head, he expects to see the surrounding environment move accordingly. Spatial presence is enhanced by the ability of game technology to match expected *proprioception*, the anticipated sense of body orientation and movement.

A medium with great depth is one that delivers substantial information through each sensory channel. For example, the bandwidth transmission capabilities of the telephone provide considerably less auditory information than stereophonic systems of today's high-end games. In similar fashion, today's electronic-game graphics are dramatically more vivid than those in early games such as *Pac-Man*. Increased graphic capabilities parallel the phenomenal advancements in gaming technology. Successive home console and computer systems continue to display higher resolution and more colorful graphics. The results are electronic games with people and environments that look *real*. Although not yet equal to real-world video images, the vivid graphics of modern games have tremendous depth. Virtual reality games add to this depth by providing motion parallax through the use of head-tracking devices and stereoscopic displays that mimic binocular disparity — both considered a powerful source of spatial presence (cf. Heeter, 1992). Steuer (1992) suggested that breadth and depth interact to create spatial presence, but that cross-modal sensory activation can produce a strong feeling of presence even when signal depth is low.

Interactivity refers to the user's ability to influence the form and content of an environment (Steuer, 1992), and is considered a prerequisite of spatial presence by some (e.g., Zahorik & Jenison, 1998). Steuer (1992) identified three factors governing interactivity: *speed* (the time required for the environment to respond to input), *range* (the number of environmental attributes that can be successfully manipulated and the amount of alternatives available for each attribute changed), and *mapping* (how closely actions represented in the virtual environment match the natural actions used to change a real environment). The interactivity of electronic games has increased considerably in recent years, specifically in terms of range and mapping (Skalski, 2004). Early games were quite restricted in the number of environmental attributes that players could manipulate, probably due to limitations in the gaming hardware of the time. For example, the first entry in the popular *Mortal Kombat* series focused mainly on the moves and actions of combatants, with little attention to the surrounding environment. The newest version of the game (*Mortal Kombat: Deception*), however, features wide-ranging interaction allowing players to manipulate and destroy many aspects of the environment. In this game and other recent fighting titles like *WWE Smackdown*, players can control different game objects (e.g., steel chairs, fire extinguishers) and use them against their opponent just as they use kicks and punches. These interactions add to the sense of being in a real environment, where similar actions are possible.

Most standard game controllers do not offer considerable mapping, but mapped devices such as steering wheels and guns are available for home systems, and arcades offer additional mapping options. Arcade driving games like *Need for Speed* have steering wheels, gear shifters, and pedals that allow players' hands and feet to interact in real-time using natural actions to alter the virtual environment. When this happens instantly in substantial and meaningful ways, the interactivity should create a heightened sense of spatial presence. The extent to which interactivity is possible within an electronic game can be seen as a product of the technology,<sup>3</sup> however, although technology might help open the door to spatial presence, the essence of spatial presence lies in the perceiver.

## Involvement, Immersion and Spatial Presence in Electronic Games

A medium's ability to focus the users' attention is a central determinant of spatial presence (Fontaine, 1992). Witmer and Singer (1998) maintained that focused attention leads to *involvement* and *immersion*, two psychological states considered by some as the essence of experiencing presence. The attention leading to involvement is generally thought to result from the meaningfulness produced by an environment's form and content; whereas for immersion, focus is largely regarded a product of the technology's ability to control the stimulus environment. When things in an environment are coherent and connected, it focuses our attention on one meaningful stimulus set (McGreevy, 1992). Witmer and Singer (1998) maintained that a medium's ability to focus user attention on a meaningful stimulus leads to *involvement*—a form of internal mental vigilance characterized as being cognitively engrossed. Meaning can occur as a result of the type of cross-model consistency discussed above, where simultaneous reception of redundant information from different sensory channels merges in coherence to produce a meaningful experience (Steuer, 1992). Perhaps as importantly, however, meaning is also drawn from the successful application of a user's mental model.

In game environments, the ability of users to apply existing mental models to the objects and events in virtual worlds allows them to make sense of the world—something widely held as critical for experiencing spatial presence (Witmer & Singer, 1998; Wirth et al., 2003). Past research indicates that spatial presence is enhanced by the game's ability to arrange objects and scenery in a manner consistent with expectations (Hoffman, Prothero, Wells, & Groen, 1998). A similar influence might be expected from the narrative structure of many games. Games that offer dramatic content and meaningful plots consistent with models from a user's actual or virtual past experience should generate a continuous flow that facilitates involvement and subsequent spatial presence (Slater & Wilbur, 1997).

Whereas involvement depends on the meaningfulness of an environment and centers on mental vigilance, immersion is determined by the environment's ability to isolate people from other surrounding stimuli. Immersion is characterized as the sense of being enveloped by and interacting with an environment—something often thought of as the degree to which a medium controls the user's access to stimuli (Witmer & Singer, 1998). Environments create immersion to the extent that they can insulate individuals from their physical environment, create the sensation that they are inside the environment instead of an outside observer, and generate a feeling that they are can interact and move within the environment in a natural manner. Witmer and Singer suggested that involvement can occur in almost any type of environment, whereas immersion is much more likely to occur in environments that isolate the user or create the perception of inclusion, natural interaction, and control. For example, an arcade racing-car game with a steering wheel that vibrates and gives the user a feeling of control might have more immersive qualities than watching the Indianapolis 500 on an IMAX screen. Similarly, the isolation produced by a head-mounted display used to create a virtual reality environment is likely to be more conducive to immersion than a playing an electronic game in the distracting environment of a busy arcade.

Wirth et al. (2003) presumed that both isolation and mental vigilance can produce the type of continuous information flow that promotes spatial presence; however, they noted that mental vigilance is more an act of volition associated with characteristics of individuals. Strong user motivations to remain involved in a virtual environment can overcome outside distractions and perpetuate strong experiences of spatial presence. As such, presence can be experienced by many individuals even when the immersive quality of technology is poor. The importance of volition to compensate for technological limitations focuses our attention on the individual's role in the experience of spatial presence.

## Individual Differences in Experiencing Spatial Presence

Although most attempts to identify determinants of spatial presence deal with characteristics of specific media, some attempts have been made to uncover the characteristics of individuals that impact this experience. Several different scholars identify trait and state variables thought relevant to the experience of presence (e.g., Ijsselstein et al., 2000; Steuer, 1992). For example, Wirth et al. (2003) suggested that spatial presence is influenced by individual differences in user ability (information processing speed, spatial ability, absorption, need for cognition, self-efficacy, and domain-specific interest) as well as state differences like mood and user fatigue. Yet, to date there is little evidence to show how these variables impact experienced presence. We might expect spatial presence to flourish in those who are fascinated by virtual environments, and whose ability to quickly process information not only allows them to visualize imagined spatial structures but also richly elaborate on them. Skills allowing successful control of virtual environments and the confidence this brings can increase the likelihood of experiencing spatial presence, particularly in virtual environments of special interest to individual users. Tamborini et al. (2004) supported this notion by showing that previous use and preference for specific game genres predicts feelings of spatial presence experienced during game play. Meaning emerges when the user can successfully apply existing mental models to familiar scenery and thus make some sense of it. Related work on state differences suggests that situational user attributes can shape spatial presence. For example, Wirth et al. (2003) argued that fatigue can impair cognitive processing and elaboration capacities that help experiences of presence occur.

## SOCIAL PRESENCE: BEING WITH OTHERS IN ELECTRONIC GAMES

*Tron* might have been unbelievable to most viewers in 1982, but the box-office success of more recent films delving into the world of electronic games suggests a change in the audience's willingness to accept the reality of virtual worlds. Today, the commonality of these experiences (due to the rapid diffusion of virtual technology) provides a different mental model of virtual agents for audiences. Although gaming in 1982 often involved a single human player and a number of computer-controlled characters, today's games create more social environments, the type represented by another (and fittingly more recent) movie, *Spy Kids 3D: Game Over* (2003). In this film, the spy kids, Carmen and Juni, enter an electronic game world in which they interact both with computer-controlled beings and other humans entering the virtual environment to play alongside them. The human-to-human interaction in the movie's virtual game world parallels the emergence of highly social electronic games in the past decade, such as Massively Multiplayer Online Games (MMOGs). Though this sensation of "being with" probably happens during many gaming experiences, Multi-User Dungeons (MUDs) and MMOGs have great potential to make players feel a sense of *social presence*. Undoubtedly, social presence is an important part of these experiences.

Though social presence might seem like a simple concept, many definitions have been advanced. In the context of mediated communication, contemporary thinking about social presence probably originated in the work of Short, Williams, and Christie (1976), who defined the concept as "the degree of salience of the other person in [an] interaction and the consequent salience of the interpersonal relationships" (p. 65). Importantly, this definition suggests that social presence is more than just a dichotomous "here or not" judgment. Instead, it exists along a continuum affected by individual perception and communication technology. The work of Short et al. on social presence has been adopted by scholars interested in determining the suitability of various media forms for different types of social interaction (e.g., Rice, 1993).

Ultimately, it involves the use of media for social purposes. Reeves and Nass (1996) have demonstrated that people have an evolutionary-based tendency to treat media like real social beings. This innate reaction should be enhanced through socially rich applications like online electronic games.

Recent work on social presence has taken a more user-centered (versus technology-centered) approach to the concept, consistent with contemporary notions of presence as a psychological state (Lee, 2004). In contrast to Short et al.'s research that focuses on user perceptions of a medium's ability to make others salient, this work examines the actual perceived salience of the other (Nowak, 2001) based on media attributes. This has led to the development of social presence "theory" focusing on two fundamental issues: (a) the *technology* question, that is, how changes in properties of media interfaces affect social presence and (b) the *psychological* question, that is, what properties of humans elicit attributions of cognitive states and other aspects of social presence to mediated representations (Biocca, Harms, & Burgoon, 2003). To help answer these questions, Biocca et al. have identified three dimensions of the concept: copresence, psychological involvement, and behavioral engagement.

### Dimensions of Social Presence

Biocca et al.'s (2003) three dimensions highlight different instances in which social presence can be experienced in electronic games. Copresence is a manifestation of social presence that should happen in most electronic games, whereas psychological involvement and behavioral engagement are more likely in newer games, particularly those played by multiple users at the same time. Together, the three dimensions reveal how widespread and potentially complex the sensation of social presence can be in response to electronic games.

Copresence, in its most basic form, involves sensory awareness of an embodied other (Goffman, 1959), though it can also refer to feelings of spatial presence with another and/or a sense of mutual awareness. The seminal work by Goffman in this area emphasizes the role of the human senses in social interaction. This emphasis makes Goffman's thinking particularly applicable to media experiences that extend the senses to bodily representations (Biocca et al., 2003), including electronic game experience. Most games include visible "others" and should therefore generate some copresence, whether it is with swarms of zombies in *Diablo II* or human amusement park visitors in *Roller Coaster Tycoon*. Copresence might also share properties with spatial presence, if it is thought of as the feeling of being in the same space or location of another. This is a likely effect of more advanced VR gaming technologies that place players into virtual environments. Finally, copresence has been extended by Goffman and others to include *mutual awareness*, where the user is aware of the other and the other is aware of the user (Biocca et al., 2003). Interestingly, this type of copresence induction is missing from traditional non interactive media experiences such as television, though some viewers might perceive that television personalities are aware of them. However, most electronic games have a strong potential to create a sense of mutual awareness. For example, in games where enemy zombies attack a player character, the behavior of the computer beings (e.g., rushing over to attack) shows an awareness of the player character. Moreover, although copresence might play only a minimal role in determining the success of action/violence games, the heightened potential for copresence in new game technology seems central to the success of relationship games like *The Sims*. Although nonviolent electronic games have not sold as well customarily, we expect this to change as the potential for social presence in games increases.

Psychological involvement is a sense of access to intelligence. As Biocca et al. (2003) noted, basic sensory awareness of another (copresence) might not be enough to activate feelings of social presence when perceived intelligence is missing. Many electronic games, especially older ones, may be lacking in this regard. The second author of this chapter vividly remembers

playing electronic football games in which a weakness in the defense could be exploited over and over again, with no adjustments. Though this was good for his self-esteem (he never lost), it did not do much for his sense of social presence. Because many electronic game characters are limited in intelligence (i.e., typically programmed only to "beat the player"), they might not be thought of as fully social beings. For psychological involvement to happen, the virtual body has to provide cues to its intentional states (Dennett, 1987). In electronic games, these cues have become more common in recent years due to advances in artificial intelligence (AI) programmed into computer-controlled agents. The latest versions of the *Madden* football series, for example, have been praised for their AI (e.g., Smith, 2001), and adventure games like the classic *The Legend of Zelda* include computer characters who "speak" to the player through text. These cues to intelligence should increase psychological involvement, something especially likely to happen in newer games like *The Sims* or *Singles—Flirt up your Life*, which are brimming with seemingly smart beings that foster feelings of intimacy, immediacy, and mutual understanding. These attributes are recognized components of psychological involvement (Biocca et al., 2003) and share the ability to reveal forms of intelligence that signal social presence.

The final dimension of social presence, behavioral engagement, focuses on behavioral interaction or synchronization. At this stage, entities engage in social behaviors such as talking, chatting, turn taking, eye contact, and nonverbal mirroring. Biocca et al. (2003) discussed behavioral engagement as a recent addition to research on social presence that has developed among scholars interested in the wide range of interaction channels possible in newer, high-bandwidth immersive virtual environments and advanced electronic games. For example, although the limited text-based chat of early online games surely slowed interaction and interfered with immersion, the broadband-enhanced voice chat programs available today allow levels of social presence previously unavailable. Systems like *Teamspeak* give players the ability to talk online as they are playing together. The military game *SOCOM* for Playstation 2 can be purchased with a headset through which voice commands may be issued to responsive teammates during missions. This verbal form of communication provides a more natural interface that increases perceptions of behavioral engagement. Other examples of increased synchronization can be seen in the advanced nonverbal behaviors displayed by characters in newer, graphically vivid games. Avatars and agents in games like *Halo* heighten behavioral engagement by maintaining the appearance of eye contact during interactions. Recent research on online games suggests that players use the realistic-looking nonverbal cues in today's games for a variety of purposes, including the prediction of an opponent's actions (Bracken, Denny, Utt, Quillan, & Lange, 2003). This research highlights the importance of nonverbal cues as a source of behavioral engagement.

### Online Games and Social Presence

The recent surge in popularity of online games has opened up a host of new and fascinating possibilities for behavioral engagement along with other aspects of social presence. Particularly striking in this regard is the success of the MMOG genre. These games, which now include fantasy, science fiction, superhero, and even everyday life offerings, consist of vast, graphically rich electronic environments populated by a variety of social beings. Although these beings might "look" like computer-controlled entities, many are controlled by humans playing over the Internet who develop characters to take part in adventures. The motivations for playing these online games extend far beyond adventuring, however. In a survey of *Everquest* players, Griffiths, Davies, and Chappell (2003) found the favorite aspect of the game is its *social features*. In MMOGs these features can include chatting with other players, working in teams, or joining guilds and social groups (Emery, 2004), all of which are forms of behavioral engagement and

psychological involvement. The social features of games can also extend to the ways in which the players are represented graphically in the environment, which can perpetuate a sense of copresence. For example, early online role-playing games were text based and perhaps less likely to remind players that other social entities were present than graphically rich newer games. As the social presence-inducing ability of these games continues to increase, these dimensions should become more important motivations for use.

## SELF-PRESENCE: MANIFESTATIONS OF SELF IN ELECTRONIC GAMES

Though self-presence has received much less attention than other dimensions of presence, it can play a critical role in the understanding of electronic game experience. Some researchers consider self-presence simply as a part of spatial presence (Ijsselstein et al., 2000; Wirth et al., 2003), but its conceptual distinction from other dimensions seems great enough to warrant individual consideration. Moreover, the recent focus of electronic game technology on features that cultivate a player's awareness of themselves within the game environment warrants separate discussion.

Biocca's (1997) definition of self-presence identifies three "bodies" present in a virtual world: the actual body, the virtual body, and the body schema, or the user's mental model of self. He argued that when we see a graphic representation of ourselves within a virtual environment, the representation evokes mental models of our body as well as our identity. Moreover, because these mental models of self are open to change (Fisher, 1970), embodiment in a virtual world can alter both mental models, especially when the environment makes the embodied self salient. In other words, the logic argues that experiences of self-presence can alter both our self-image of our body as well as our social identity — an intriguing possibility in light of the growing popularity of games where players assume fantasy identities.

The potential influence of embodied experiences seems far-reaching. New game technology can provide redundant forms of simultaneous cross-modal sensory activation in a manner that closely maps a player's body movements. This should cultivate a mental model of being inside the game environment (Biocca, 1997). A significant advancement in this area has been the incorporation of first-person point of view (POV) into games.

First-person POV exploded onto the gaming scene with the release of *Wolfenstein 3D* in the early 1990s. In this game, the player-character walked around a labyrinth to fight Nazis and other enemies. Unlike other action offerings at the time, however, the walking was done through the eyes of the main character. Instead of the character appearing on the screen and moving, the environment moved as if the player were traveling around in it. In addition, a representation of the hands of the main character holding a weapon was included at the bottom of the screen, mainly to make the player feel more in the "space" of the game (McMahan, 2003). Today these features have been incorporated into many games as part of the highly successful 3-D first-person shooter genre. In the future we can expect even stronger perceptions of self-presence as VR technology increases its ability to completely coordinate virtual body movement with tracking devices, thereby reducing problems with proprioception that could otherwise terminate feelings of presence (Slater & Usoh, 1994).

Though discussion of self-presence in this sense focuses on body schemas created in first-person POV games, we should not overlook the fact that like all forms of presence, self-presence is first and foremost a product of cognition. As such, it is not determined solely by first-person POV and game technology's ability to limit problems of proprioception. For example, some new game technologies generate representations of players inside the virtual environment

without creating first-person POV. The most notable example of this type of technology is the Sony EyeToy, a small camera that captures the images of players and puts these images into games. Also notable is the ability of mapping to induce feelings of self-presence. Biocca (1997) suggested that close mapping of a virtual body to a user's actual physical body has a strong influence on both experience in VR environments and outcomes from experience. We can expect that game makers will continue to pay close attention to developing technology that creates graphic representations of the player and/or the sensation of being inside the game environment. As electronic games continue along this path, the role of self-presence as a critical factor in shaping future game experience will escalate.

## **UNDERSTANDING THE CONSEQUENCES OF PRESENCE**

With the rapid development of presence-inducing technology and the ever-increasing growth in video game use, understanding the role of presence in shaping the outcomes from electronic-game play is a challenge of increasing consequence. Undoubtedly, many theoretical perspectives can add to our understanding of presence and electronic-game enjoyment (Klimmt & Vorderer, 2003). Still, the need for additional theories and models that can address the dual roles of witness and participant unique to interactive forms of entertainment research is apparent here (Vorderer, 2000). This section examines how presence can affect the use and enjoyment of games as well as the development of mental models influencing intended and unintended effects of game exposure.

### **Use and Enjoyment of Presence-Inducing Electronic Games**

The ability of presence to influence the selection and use of electronic games is important for both practical and theoretical purposes. The growth in sales of presence-inducing games not only affects electronic game industry profit, but also increased game use can reduce time spent with other media and resulting advertising revenues (Powell, 2003). More central to our concern, however, is the potential for presence-inducing technology to alter the experience of game play along with its social and psychological consequence for users. Can this explain user enjoyment, the selection of particular titles, the enormous time spent with these games, or potential electronic-game dependency?

In entertainment literature, Zillmann's work on mood management and selective exposure (Zillmann, 2000) suggests that media use is often determined by its ability to serve the user's immediate affective needs, even if the needs are unknown. As such, we might expect strong and lasting states of presence in environments that serve emotional needs. This logic generally predicts that heightened presence should only occur when users in positive mood states are absorbed in virtual environments with matching valence. At the same time, however, selective exposure logic suggests that games allowing users to master feelings of fear should create a heightened sense of presence and lead to extended use. Already, research in clinical psychology suggests the value of presence-inducing technology for treating phobic disorders (Strickland, Hodges, North, & Weghorst, 1997). But whereas clinical use should be limited, entertainment theory predicts broad use for games allowing players to overcome ordinary anxieties. Evidence of this is seen in research on exposure to horror films suggesting that selection results in part from the desire of young men to master their fears (Tamborini, 2004). Signs that this occurs in electronic games might already be apparent in the popularity of survival-horror games such

battle hordes of fierce monsters in highly immersive environments. It is not hard to imagine similar uses of electronic dating games like *Singles — Flirt up your Life*, where young men can confront their fear of rejection and other relationship-based anxieties in less interpersonally threatening game environments. Moreover, although it is hard to think of existing electronic games promoting experiences of grief, the popularity of tragic novels and film suggests the possibility that immersive games allowing users to confront these anxieties could also attract large audiences.

The connection of presence with enjoyment is hard to overlook. To some, the types of emotional experience we label as joy or delight are nothing more than pleasurable forms of what they call absorption or presence (Klimmt & Vorderer, 2003). Yet even if you do not define enjoyment as a form of presence, enjoyment is perhaps the primary outcome sought and experienced from electronic games and profitable presence-inducing technologies like IMAX films and simulator rides. As suggested by Lombard and Ditton (1997), these experiences are popular because they are fun — a concept central to literature explicating the role of presence in entertainment's appeal. Klimmt and Vorderer (2003) emphasized the need to integrate research on presence with entertainment theory, and gave examples of how the enjoyment of presence can be understood in terms of rationales related to user dispositions, mental simulation of fictional events, and the psychological mindset of play. Undoubtedly, theory on media entertainment will enhance our understanding of the role of presence in the experience of electronic games.

### **Mental Models as a Consequence of Spatial Presence**

Logic derived from research on mental models (Roskos-Ewoldsen, Roskos-Ewoldsen, & Dillman Carpentier, 2002) and script theory (Schank & Abelson, 1977) provides the foundation for our position that the natural mapping and interactive control found in presence-inducing game technology should not only facilitate the development of more complete mental models, but should also increase their accessibility for use. Perhaps we do little more than echo the thoughts of those who note how natural mapping provides more accurate behavioral information. However, although interactivity and control are often discussed as contributors to the experience of spatial presence, we feel that important aspects of interactive control's contribution to the development of comprehensive mental models are sometimes overlooked. In this regard, the vigilance needed to control events in a virtual environment sets it apart from other media. Unlike television that continues on its own, electronic games and other interactive media require focused attention for the game to continue. The importance of such control is twofold: Not only should the vigilance required for control increase the salience of the mental models activated, but control in this circumstance also implies a decision to act.

We argue that the rehearsal of decision making is significant both because active decision making increases the sense of presence and because it adds to the structure of mental models formed through virtual experience in ways previously thought unique to actual experience. Certainly this influence is unfeasible in media that do not, by necessity, expose users to decisional cues. For example, Tamborini (2000) argued that the decision to strike or not strike an opponent made when playing violent electronic games creates a more complete mental model of aggression than that which results from watching violent television or film where decisional models are absent. Particularly with games requiring basic motor skills already part of an actor's repertoire (e.g., the act of bending your finger to pull a trigger), the virtual decision to act seems more important than the act itself in its contribution to the development of mental models. Most acts performed in an electronic game involve decision-making behaviors and triggering actions not part of other media experience. Their constant rehearsal in repeated play should make them a powerful part of the mental model.

Within this framework, presence should strengthen the influence of electronic games on a number of different behaviors, yet the greatest concerns involving electronic games emphasize the potential for unintended anti-social outcomes like those related to violence. Tamborini (2000) spoke to this issue directly by evoking an image of children playing electronic games that create worlds of virtual violence more realistic and engaging than actual experience. He argued that immersion in these games inducing players to rehearse violent plans, decisions to aggress, and the actual motor skills used to assault and kill can foster the development of mental models for aggression—models lacking many critical inhibitors associated with most actual experience. Given the preponderance of electronic games containing violence (Smith, Lachlan, & Tamborini, 2003), the special concern for unintended aggressive consequence comes as no surprise. Yet we should not overlook the potential for an equally strong influence on the development of mental models for other behaviors represented in various games. The growing popularity of electronic games like *The Sims* or, even more, those featuring highly involving intimacy behaviors like *Singles—Flirt up your Life* hold promise for great influence on related mental models. It is not hard to imagine players experiencing heightened presence in worlds of virtual desire, or to imagine these experiences shaping mental models governing decisions associated with dating behaviors.

Although we want to highlight the importance of decisional cues stemming from interactive control as a determinant of outcomes from presence-related experience, we still note the prominent role of mapping. Natural mapping should strengthen the influence of electronic games on the development of diverse mental models, both favorable and adverse. The Xbox game *Yourself!Fitness*, for example, encourages various exercises through a virtual trainer named Maya. The addition of interface technology that allows the actual physical activity to occur (e.g., a treadmill for running) would likely increase spatial presence as well as contribute to physical fitness. In this case, the physical benefits of the game result both directly from the motivated exercise and indirectly through the strengthening of more fully mapped mental models giving rise to exercise in the future. One can imagine similar applications of electronic games designed to train or simply amuse where natural mapping could engage students in dedicated behavior and make the rehearsal of relevant actions and concepts fun. Some professional race car drivers, for example, report using realistic racing video games like *NASCAR Thunder* to prepare for events. Inclusion of steering wheels, pedals, and advanced haptic feedback systems can simulate the feel of speeding around corners and allow virtual racers to see, hear, and feel what it is like to drive a particular car at different track locations. Claims that playing helps drivers learn course layouts (Emmons, 2003) suggest that the game helps build mental models of different tracks and the actions needed to navigate them for use in actual races. The strong sense of spatial presence created by this type of immersive environment provides information for use in the development of mental models unavailable to observers in traditional media environments (Skalski, Tamborini, & Westerman, 2002). Moreover, the repeated rehearsal this promotes should lead to the formation of stronger and more developed mental models.

### **Mental Models and Self-Presence**

Closely connected with mental models originating from spatial presence is a person's mental model of self. Biocca (1997) suggested that close mapping of a user's actual physical body to virtual body evokes a mental model of self within the virtual environment capable of changing our self-image. If representations of the self implicit in avatars really do result in distortion of body schema and social identity, predictable patterns of influence are expected from sets of avatar attributes commonly found in different game genre. For example, Anderson and Di (2000) suggested that an electronic video game's first-person point of view and an active role in decision making help form chronically accessible mental models that change an individual

personality. Their general aggression model (GAM) submits that these attributes play a critical role in explaining how violent video games influence aggressive personality. By similar token, self-presence inducing technology in different game genres should help change other aspects of self-image, such as those related to gender and intimacy. Tamborini and Mastro (2001) argued that media play a powerful role in the development of social identities, and their ability to activate perceptual frames can govern how we see the social environment and ourselves. Such distortions should increase when the environment makes the embodied self salient. Tamborini (2000) made this point by arguing that increased identification with characters in presence-inducing electronic games strengthens effects from exposure—an experience heightened in first-person point of view games by players adopting a character's role (Laurel, 1991). Media's ability to make attributes of identity salient creates mental models that are part of the ongoing process of negotiating self-image.

### **Mental Models and Social Presence**

Beyond the roles of spatial and self presence in the development of mental models for social behavior, other unintended outcomes are expected from the social presence created by electronic games. In addition to technology's ability to create a sense of social presence and satisfy companionship needs, the behavioral engagement and psychological involvement created by electronic gaming, particularly through online game experiences, provide unique opportunities for community building. For example, developers of the game *Yourself! Fitness* envision users creating an online community akin to a virtual gym where players use wireless headsets to talk during game play and encourage each other (Taub, 2004). One of the most interesting issues raised by this image involves the potentially broad social consequence of online gaming.

In his seminal book entitled *Bowling Alone*, Putnam (2000) claimed that as a culture we have become increasingly disconnected from each other. He argued that change over the last few decades has led to a decline in social capital, or the value we extract from the strength of our connection to family, friends, and social structures. In addition to underlying social and economic cause, developments in technology like television and computers are singled out by Putnam as contributors to this decline, alleging that these changes lead to fewer people joining organizations, connecting with their neighbors, or having a "we" mentality. Instead, more people are just "bowling alone." The image associated with this claim is a picture of isolated television viewers and alienated electronic gamers playing against agents incapable of producing the social capital Putnam values. But as the electronic game industry continues to develop along lines of social presence-inducing technology, we must ask if the social presence available here can reconnect electronic gamers through virtual communities. Just as reading groups contributed to the creation of social institutions that helped reconnect U.S.-Americans in the late 1800s, do MOGs and MMOGs help develop social networks that bring cooperation, reciprocity, trust and support even outside the game environment? Or, are most players just gaming alone? Though no research directly addresses this issue, evidence that heavy electronic-game players are more likely to spend time with their friends and feel closer to their family (Colwell, Grady, & Rhaiti, 1995) supports notions that electronic games can strengthen social capital.

### **CONCLUSION: PRESENCE AND GAMING SCHOLARSHIP**

The phenomenal growth in electronic-game technology was overlooked for some time, but attention to it today is evident from this book. Compelled by escalating industry sales and

reports of users captivated by their passion to play, scholars who once dismissed electronic games as unworthy of study are now rushing to discover the secrets of its appeal and the consequence of its use. We believe that the unique presence-inducing qualities of electronic games are central in both regards. Developments in game technology fostering presence not only increase exposure to electronic games, but also shape the form of resultant mental models that govern how we move in physical space, how we interact in social settings, and even how we see ourselves. It can influence a host of outcomes ranging from the affect expressions used to pursue relational intimacy to the benefits gained from interactive learning. The vividness and interactivity of current games offer compelling mental models of spaces and people, and this will increase over time. We strive to focus attention toward the study of presence and encourage the development of related theory. Electronic games are poised to become the *ultimate* presence-inducing medium, making presence central to research exploring the experience of electronic games.

## NOTES

<sup>1</sup>In this discussion we purposely avoid using Lombard and Ditton's (1997) often quoted phrase that defines presence as the "perceptual illusion of nonmediation." This was done in order to preclude giving readers the impression that we define presence as a form of illusion. While debate over this issue is beyond the scope of this chapter, the authors consider presence a virtual experience that need not be identified as illusory.

<sup>2</sup>Clearly, there is still disagreement concerning the dimensions that constitute the experience of presence or even whether presence should be understood as the composite of several dimensions or a process. Some scholars question whether presence is nothing more than a special case of involvement (Klimmt & Vorderer, 2003). Other scholars think it more useful to consider presence as a process (Wirth et al., 2003). In general, current conceptualizations of presence are understood as typologies identifying different dimensions of presence based on domains of experience.

<sup>3</sup>Some presence scholars argue that interactivity is determined by the capability of a medium to create a mental model of possible interactions and not the ability to interact per se (Wirth et al., 2003).

## REFERENCES

- Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology*, 78, 772-790.
- Biocca, F. (1997). The cyborg's dilemma: Progressive embodiment in virtual environments. *Journal of Computer Mediated Communication*, 3(2). Retrieved May 29, 2004, from <http://www.ascusc.org/jcmc/vol3/issue2/biocca2.html>
- Biocca, F., Harms, C., & Burgoon, J. K. (2003). Toward a more robust theory and measure of social presence: Review and suggested criteria. *Presence: Teleoperators and Virtual Environments*, 12(5), 456-480.
- Biocca, F., Inoue, Y., Lee, A., Polinsky, H., & Tang, A. (2002, October). *Visual cues and virtual touch: Role of visual stimuli and intersensory integration in cross-modal haptic illusions and the sense of presence*. Paper presented at the Fifth International Workshop on Presence, Porto, Portugal.
- Bracken, C. C., Denny, J., Utt, K., Quillan, M., & Lange, R. (2003, October). *Sometimes I really hate coming back to this world: Presence and on-line video game playing*. Paper presented at the Sixth International Workshop on Presence, Aalborg, Denmark.
- Colwell, J., Grady, C., & Rhaiti, S. (1995). Computer games, self-esteem, and gratifications of needs in adolescents. *Journal of Community and Applied Social Psychology*, 5, 195-206.
- Demaria, R., & Wilson, J. L. (2002). *High score! The illustrated history of electronic games*. Berkeley, CA: McGraw-Hill/Osborne.
- Dennett, D. C. (1987). *The intentional stance*. Cambridge, MA: MIT Press.
- Emery, Jr., C. E. (2004, April). Turbine software creating a gamer's world. *The Providence Journal*. Retrieved May 1, 2004, from <http://www.projo.com/technology/content/projo.20040420.turbine.127f8b.html>.
- Emmons, M. (2003, June). Cutting-edge video games have a place in race-day preparation. *The San Jose Mercury News*. Retrieved May 1, 2004, from <http://www.mercurynews.com/ml/mercurynews/sports/6144871.htm?l>.
- Fisher, S. (1970). *Body image in fantasy and behaviors*. New York: Appleton-Century-Crofts.

- Fontaine, G. (1992). The experience of a sense of presence in intercultural and international encounters. *Presence Teleoperators and Virtual Environments*, 1(4), 482-490.
- Goffman, E. (1959). *The presentation of self in everyday life*. Garden City NY: Anchor.
- Griffiths, M. D., Davies, M. N. O., & Chappell, D. (2003). Online computer gaming: A comparison of adolescent and adult gamers. *Journal of Adolescence*, 27, 87-96.
- Heeter, C. (1992). Being there: The subjective experience of presence. *Presence: Teleoperators and Virtual Environments*, 1(2), 262-271.
- Hoffman, H. G., Prothero, J., Wells, M. J., & Groen, J. (1998). Virtual chess: Meaning enhances users' sense of presence in virtual environments. *International Journal of Human-Computer Interaction*, 10(3), 251-263.
- Ijsselstein, W. A., de Ridder, H., Freeman, J., & Avons, S. E. (2000). Presence: Concept, determinants, and measurement. *Proceedings of the SPIE, Human Vision and Electronic Imaging V*, 3959-3976.
- Klimmt, C., & Vorderer, P. (2003). Media psychology "is not yet there": Introducing theories on media entertainment to the presence debate. *Presence: Teleoperators and Virtual Environments*, 12(4), 346-359.
- Kushner, D. (2003 July). With a nudge or vibration, game reality reverberates. *The New York Times*. Retrieved July 8, 2003 from <http://www.nytimes.com/2003/07/03/technology/circuits/03next.html>.
- Laurel, B. (1991). *Computers as theatre*. Menlo Park, CA: Addison-Wesley.
- Lee, K. M. (2004). Presence, explicated. *Communication Theory*, 14(1), 27-50.
- Lombard, M., & Ditton, T. (1997). At the heart of it all: The concept of presence. *Journal of Computer Mediated Communication*, 3(2). Retrieved May 29, 2004, from <http://www.ascusc.org/jcmc/vol3/issue2/lombard.html>
- McGreevy, M. W. (1992). The presence of field geologists in Mars-like terrain. *Presence: Teleoperators and Virtual Environments*, 1(4), 375-403.
- McMahan, A. (2003). Immersion, engagement and presence: A method for analyzing 3-D video games. In M. J. P. Wolf & B. Perron (Eds.) *The video game theory reader* (pp. 67-86). New York: Routledge.
- Nowak, K. (2001, May). *Defining and differentiating copresence, social presence, and presence as transportation*. Paper presented at the Fourth International Workshop on Presence, Philadelphia, PA.
- Powell, C. (2003 July). Get in the game. *Marketing Magazine*. Retrieved May 29, 2004 from [http://www.marketingmag.ca/magazine/current/feature/article.jsp?content=20030728\\_55703\\_55703](http://www.marketingmag.ca/magazine/current/feature/article.jsp?content=20030728_55703_55703)
- Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.
- Reeves, B. R. (1991). "Being there": Television as symbolic versus natural experience. Unpublished manuscript, Stanford University, Institute for Communication Research, Stanford, CA.
- Reeves, B., & Nass, C. (1996). *The media equation*. New York: Cambridge University Press.
- Rice, R. (1993). Media appropriateness: Using social presence theory to compare traditional and new organizational media. *Human Communication Research*, 19, 451-484.
- Roskos-Ewoldsen, D. R., Roskos-Ewoldsen, B., & Dillman-Carpentier, F. R. (2002). Media priming: A synthesis. In J. B. Bryant & D. Zillmann (Eds.) *Media effects: Advances in theory and research* (pp. 97-120). Mahwah, NJ: Lawrence Erlbaum Associates.
- Schank, R. C., & Abelson, R. P. (1977). *Scripts, plans, goals, and understanding*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. London: Wiley.
- Skalski, P. (2004, April). *The quest for presence in video game entertainment*. Panel presentation at the Annual Conference of the Central States Communication Association, Cleveland, OH.
- Skalski, P., Tamborini, R., & Westerman, D. (2002, November). *Script development through virtual worlds*. Paper presented at the Annual Conference of the National Communication Association, New Orleans, LA.
- Slater, M., & Usoh, M. (1994). Body centered interaction in immersive virtual environments. In N. M. Thalmann & D. Thalmann (Eds.) *Artificial life and virtual reality* (pp. 125-148). New York: Wiley.
- Slater, M., & Wilbur, S. (1997). A framework for immersive virtual environments (FIVE): Speculations on the role of presence in virtual environments. *Presence: Teleoperators and Virtual Environments*, 6(6), 603-616.
- Smith, J. (2001). Madden 2002 X-Box review. *The Sports Gaming Network*. Retrieved May 5, 2004, from [http://www.sports-gaming.com/football/madden\\_2002/review\\_xbox.shtml](http://www.sports-gaming.com/football/madden_2002/review_xbox.shtml)
- Smith, S. L., Lachlan, K., & Tamborini, R. (2003). Popular video games: Quantifying the presentation of violence and its context. *Journal of Broadcasting & Electronic Media*, 47, 58-76.
- Steuer, J. (1992). Defining virtual reality: Dimensions determining telepresence. *Journal of Communication*, 42(4), 73-93.
- Strickland, D., Hodges, L., North, M., & Weghorst, S. (1997, August). Overcoming phobias by virtual exposure. *Association for Computing Machinery*, 40(8), 34-39.
- Tamborini, R. (2000, November). *The experience of telepresence in violent video games*. Paper presentation at the Annual Conference of the National Communication Association, Seattle, WA.
- Tamborini, R. (2004). Enjoyment and social functions of horror. In J. Bryant, D. Roskos-Ewoldsen, & J. Cantor (Eds.), *Communication and emotion: Essays in honor of Dolf Zillmann* (pp. 417-444). Hillsdale, NJ: Lawrence Erlbaum Associates.

- Iamborini, R., Eastin, M., Skalski, P., Lachlan, K., Fediuk, I., & Brady, R. (2004). Violent virtual video games and hostile thoughts. *Journal of Broadcasting & Electronic Media*, 48(3), 335-357.
- Iamborini, R., & Mastro, D. E. (2001). *Race, media, and social identity*. Paper presentation at the University of Michigan Conference on Media and Race, Ann Arbor, MI.
- Taub, E. A. (2004, May). Lift and reach and hold that pose, and advance to the next level. *The New York Times*. Retrieved May 26, 2004, from <http://www.nytimes.com/2004/05/24/technology/24game.html>
- Vorderer, P. (2000). Interactive entertainment and beyond. In D. Zillmann & P. Vorderer (Eds.), *Media entertainment: The psychology of its appeal* (pp. 21-36). Mahwah, NJ: Lawrence Erlbaum Associates.
- Wirth, W., Bocking, S., Hartmann, J., Klimmt, C., Schramm, H., & Vorderer, P. (2003). *Presence as a process: Towards a unified theoretical model of formation of spatial presence experiences*. Unpublished manuscript.
- Witmer, B. G., & Singer, M. J. (1998). Measuring presence in virtual environments: A presence questionnaire. *Presence: Teleoperators and Virtual Environments*, 7, 225-240.
- Zahorik, P., & Jenison, R. L. (1998). Presence as being-in-the-world. *Presence: Teleoperators and Virtual Environments*, 7(1), 78-89.
- Zillmann, D. (2000). Mood management in the context of selective exposure theory. In M. E. Roloff (Ed.), *Communication Yearbook 23* (pp. 103-123). Thousand Oaks, CA: Sage.