Chapter 4

Computers and Telepresence

A Ghost in the Machine?

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What is "real"? How do you define "real"?

The above quote is spoken by the character Morpheus (Laurence Fishburne) in the modern classic sci-fi film *The Matrix*. In this film, Morpheus helps a computer hacker named Neo (Keanu Reeves) discover a frightening truth—that human beings are actually slaves of intelligent machines in the future and that all of "reality" as we know it is actually a computer simulation called "the Matrix." Morpheus, Neo and other humans spend the rest of the *Matrix* series battling back against their machine captors, both in and out of the Matrix.

To many people, the idea of feeling present in a computer environment may conjure up scenes like something in the *Matrix*. While computers have not reached that level yet (unless we are all part of the matrix unknowingly now), computers are a medium ripe with potential for creating feelings of presence. This chapter will describe the ways in which computers can lead to presence in two main domains of study: Human-Computer Interaction (HCI) and Computer-Mediated Communication (CMC). It will review the extant literature on presence in both fields and will discuss how presence applies to many computer applications used widely today. The chapter will argue that computers have potential to help create feelings of different types of presence, and it will also give some reasons why computers are good for creating presence (both technological and personological). It will begin first with a definition of what presence is.

What is Presence?

Although other chapters in this volume give more complete definitions of presence, we feel it is important to quickly define it again for our own purposes. The concept of presence is generally defined as a sense of "being there" caused by media technologies (Reeves, 1991) or a "perceptual illusion of nonmediation" (Lombard & Ditton, 1997), though

Tamborini and Skalski (2006) downplay the illusory nature of the experience. The International Society for Presence Research (2000) further defines presence as "a psychological state or subjective perception in which even though part or all of an individual's current experience is generated by and/or filtered through human-made technology, part or all of the individual's perception fails to accurately acknowledge the role of the technology in the experience." Thus presence is communication in a mediated environment with some varying feeling of non-mediation. This perception of nonmediation occurs when the individual does not perceive the communication as being mediated and/or responds as if the medium were absent.

It is important to note that presence, as conceptualized herein, is a psychological state that exists as a continuum. Although it can be enhanced by features of the presentation, such as image size (Lombard, Reich, Grabe, Bracken, & Ditton, 2000) or image quality (Bracken, 2005; chapter 3, this volume), presence is not something inherent within a given medium. Instead, people are thought to be more or less present at a given time, and presence is a psychological state. As noted by Bracken "presence is a property of a person, and because it results from an interaction among form and content characteristics of a medium and characteristics of the media user, it can and does vary across individuals and across time for the same individual" (p. 193).

Many scholars have noted distinctions between varying kinds of presence (i.e., Lee, 2004a; Tamborini & Skalski, 2006). Generally, these distinctions break presence down into three different categories: physical presence, social presence, and self-presence. According to Lee (2004a) physical presence is "a psychological state in which virtual physical objects are experienced as actual physical objects" (p. 44). Important to the current chapter is that this also applies to experiencing virtual environments as actual physical environments. Social presence can generally be defined as "a psychological state in which virtual social actors are experienced as actual social actors" (Lee, 2004a, p. 45). It can also be thought of as the stimulation of ones intelligence by a technological actor or the realization of intelligence in a virtual actor (Biocca, 1997) without noticing the technological means (Lee, 2004a). Self-presence is defined as "a psychological state in which virtual selves are experienced as the actual self" (Lee, 2004a, p. 46). This can even lead to an awareness of oneself as existing within a virtual environment (Biocca, 1997).

All three of these types of presence, as defined here, imply that presence occurs when people experience something virtual (an environment, a person, or themselves) as if it was something non-virtual. The remainder of this chapter will focus on explaining on how computers can accomplish this for all three types of presence. It will first consider the notion of HCI, and focus on the CASA (Computers Are Social Actors)

literature (e.g., Reeves & Nass, 1996) as an example of the great power that computers can have for eliciting feelings of social presence. It will then discuss CMC literature that demonstrates how computers (and the Internet) can help achieve all three types of presence.

HCI and Presence: The Media Equation

Human-computer interaction was rare in the early days of computing technology. By the 1960s, International Business Machines (IBM) dominated the business computer industry and controlled virtually all aspects of their client's computing operations, leaving few opportunities for ordinary people to use the bulky, imposing machines (Zittrain, 2008). Yet the promise (and perils) of human-computer interaction manifested itself in several popular science fiction works and characters of the era, ranging from the calmly sinister Hal 9000 in *2001: A Space Odyssey* (1968) to the adorably helpful R2-D2 in *Star Wars* (1977). These and other fictional representations of HCI likely helped prepare people for what was to come. In the 1980s, personal computers (PCs) began to diffuse widely, and in the 1990s the Internet emerged as computing's "killer app" (Dasgupta, 2002), paving the way for mass adoption of HCI technologies. Although HCI is still not at the level of the more imaginative science fiction works of the past, it currently exists in many popular forms, including daily use of desktop, notebook, and mobile computing devices, communication with online social agent applications, and even personal companionship with robots. People are interacting with computers now more than ever before.

This section reviews scholarship on HCI and presence, specifically social presence. A considerable body of evidence has accumulated suggesting that people will respond to computers in social ways. Although this chapter primarily uses human computer interaction to refer to the phenomenon and line of research, branches of it have been referred to alternatively as scholarship on CAS and "The Media Equation," the latter of which begins this discussion.

The Media Equation: Computers = Real People

In their seminal book *The Media Equation* (1996), Byron Reeves and Clifford Nass demonstrate how people's interactions with computers and other media are virtually identical to real social relationships. The "media equation" they advance in the book is that "media equal real life" (p. 5). As evidence for this idea, Reeves and Nass conducted a series of studies that re-created a broad range of social experiences, only with media talking the place of people. Their strategy was to (a) pick a social science finding about how people respond to each other, (b) find the

place in the report where the social rule was summarized and substitut "media" for "person," (c) do the same with how the rule was tested, (c run a replication experiment, and (e) draw implications, both theoretic and practical. Specific goals of their work included improving the desig of media and advancing HCI and social scientific theories.

A total of 35 studies are reported in *The Media Equation*, an together they provide very convincing support for the premise th "media equal real life." In one experiment on politeness effects of com puters, for example (Nass, Moon, & Carney, 1999), participants we asked to use a computer to learn about topics and then evaluate t machine's performance. Half of the people were asked to do the eval ation on the same computer, while the rest were asked to do it on different computer. Results showed that participants who did the ratir on the same computer they learned from gave significantly more pos tive answers than those who did the evaluation on a different compute demonstrating that human politeness rules extend to computers. Peop were more polite to the computer they used, seemingly out of a ne to not hurt its feelings, even though computers obviously have no re emotions. This outcome was identical when, in a second experiment, t social nature of the computer was accentuated by having the compute communicate through voice instead of text. Reeves and Nass conclud that even simple computer cues like text communication can create t "social presence" of a human.

Other studies summarized in *The Media Equation* offer further e dence for the basic prediction of the book (i.e., "media = real life") a suggest many fascinating things about HCI, including the following:

- *Computer manners matter:* When people were flattered by a co puter after performing a task, they believed they did better on t task and liked the computer more than participants who were n flattered (Fogg & Nass, 1997).
- *(Computer) personality goes a long way:* People perceived comp ers that used dominant or submissive text as having more domina or submissive personalities. They also preferred computers that h personalities similar to their own (Nass, Moon, Fogg, Reeves, Dryer, 1995).
- *That's human-computer teamwork:* People teamed with a compu for a collaborative task felt more similar to the computer, thou better of it, cooperated with it more, and agreed with it more (Na Fogg, & Moon, 1996).
- *Gender stereotypes even extend to computers:* When male voic computers evaluated people, they were taken more seriously a liked more than female ones. Female voiced computers were a

perceived as less knowledgeable about technical matters but more knowledgeable about love and relationships (Nass, Moon, & Green, 1997).

To help validate the computer-based research in *The Media Equation*, a final study reported in the book tested whether people who received information from a computer thought they were interacting with the computer or the programmer. Results showed that people considered the computer, and not the programmer, to be the source of information. Clear differences were also found between those who were *asked* to think about the programmer and those who were not—interestingly, participants who were *not* asked think about the programmer felt significantly *more* positive toward the computer. Reeves and Nass (1996) conclude that the easiest and most natural response for people is to orient toward the most proximate social actor in an interaction, even if the actor is a machine. Overall, the authors convincingly show in *The Media Equation* that the social and natural rules people expect computers to follow come from the world of interpersonal interaction.

Why do people respond to computers this way? Reeves and Nass (1996) believe that these reactions are a function of evolution. For almost all 200,000 years of human history, only people exhibited rich social behaviors, and our brains have therefore become hard-wired to treat anything that *seems* real as a person, including mediated presentations. As Reeves and Nass succinctly put it, "modern media engage old brains" (p. 12). With effort, people can think their way out of these primitive reactions, but people more often *don't* scrutinize their actions or environment and instead rely on automatic responses like the ones observed in the Media Equation studies. This perspective on HCI has been since elaborated upon by Lee (2004b), who uses principles of evolutionary psychology to further explain presence and Media Equation responses. According to Lee, human survival has long depended on the automatic application of innate causal reasoning modules for the physical and social worlds. These include rapidly developed "folk physics" modules about that physical world that prevent infants from walking off cliffs, for example, as well as "folk psychology" (or "theory of mind") mechanisms about the social world that help infants quickly understand the minds of other people and later identify both helpful others and enemies. This "folk psychology" extends to computers as well, and Lee argues that the Media Equation findings "demonstrate how human beings keep using their Stone Age causal reasoning modules...when they interact with Space Age media and simulation technologies" (p. 499). As a result, he says people feel social presence even while interacting with nonhuman social actors like computers.

HCI and Social Presence Research

Unlike Lee, Reeves and Nass do not explicitly discuss the concept of social presence in *The Media Equation*, but they do use the phrase "social presence" in several places. When they refer to how computers communicate and interact like humans, for example, they say "as long as there are some behaviors that suggest a social presence, people will respond accordingly" (p. 22). They also state, while explaining the politeness research, that "we wondered what would happen if the social presence were more explicit" (p. 25). This treatment of social presence is different than how the concept is understood today, given recent advances in conceptualizing the concept as a multi-dimensional psychological state (e.g., Biocca, Harms, & Burgoon, 2003). But Reeves and Nass clearly had something similar in mind in *The Media Equation*, and a handful of studies since have tried to measure and test the idea that computers create a sense of social presence affecting exposure outcomes.

In the first major published study to explicitly address this phenomenon, Lee and Nass (2005) examined how social responses to technology influence social presence. They conducted two experiments in which participants were exposed to computer-generated voices manifesting different personalities within an e-commerce setting. They then measured social presence using a four-item index created to tap the co-presence and psychological involvement dimensions of the concept (Biocca, Harms, & Burgoon, 2003). Findings from both experiments supported the prediction that users would feel more social presence when the computer voices they heard manifested similar personalities to their own. Aside from having implications for the design of HCI technologies, this work provides empirical evidence for the assumption that social presence underlies and plays an important role in Media Equation processes.

More recent studies offer additional support and extend social presence effects into other HCI contexts, including human-robot interaction (Lee, Park, & Song, 2005), virtual social agent effects (Skalski & Tamborini, 2007), and the use of emoticons for e-learning (Tung & Deng, 2007). All of these studies measured social presence and demonstrate that it can be both an effect of media technologies (i.e., robots, interactive agents, emoticons) as well as an influence on outcomes of media exposure (i.e., social responses, information processing and attitude/behavior change, and motivation for learning, respectively). Although the measures of social presence varied from study to study, making direct comparisons difficult, this type of work nevertheless situates social presence within HCI research as an important mediating/moderating variable in several contexts.

Related HCI Research

Other studies in this area point to additional considerations. These make reference to the concept of social presence or Media Equation/CASA research without directly measuring social presence. This research has concentrated mostly on HCI applications for education. David, Lu, and Cai (2002), for example, found that adding social cues to a computer quiz versus having no cues adversely affected judgments. When a computer help agent named Phil (with a photo of a White male) blamed participants for poor performance, fairness ratings dropped significantly among female participants. This finding suggests that more social cues does not necessarily equal better with HCI, which is supported by the commercial failure of visible social agents such as the Microsoft Office "Clippy" character (Merritt, 2008). In another study looking at social agent effects, Lee et al. (2007) found that they can have positive effects in computer-based learning environments when they manifest cooperative and caring personalities. These agents were textual in nature instead of visual, however. Overall, results of studies on agent effectiveness seem to indicate that text or voice is sufficient for creating positive social responses from computers, and that the effects may be enhanced by instilling the technologies with positive personality traits.

Although the vast majority of HCI research to date has examined adult responses to computing technology, some studies have used children as participants, with consistent results. Bracken and Lombard (2004) ran an experiment in which 8- to 10-year-olds received either praise or neutral feedback from a computer and found that children have social responses to computers affecting learning, specifically recall and recognition. Turkle (2005) found that when children interact with computers, they refer less to physical qualities over time and instead focus on psychological qualities, such as the ever present statement that "the computer must be cheating" when, for example, they are unable to defeat the computer-controlled opponent in a football game. The aforementioned Tung and Deng (2007) study also used children as participants (sixth graders) and found that dynamic emoticons in an e-learning environment had positive effects on social presence and motivation to learn. This study explicitly establishes that children feel social presence and also suggests that they may be more receptive to agents and other virtual social representations, which would make sense given their greater acceptance of animated/virtual characters in general.

The Future of HCI and Social Presence

The research reviewed in this section only skims the surface of a much larger palate of possibilities for scientific inquiry into HCI and social

presence. From a research standpoint, many unanswered questions remain. Findings thus far from Media Equation and CASA studies demonstrate that variables such as personality, use of language, voice, and interactivity can influence people's social responses to computers (Lee & Nass, 2005). However, these are part of a much more complicated interaction between technology users, technology effects, and technologies themselves.

In terms of user variables, the subjective experience of social presence seems key and needs to be accounted for in future HCI research. This will allow researchers to generalize beyond specific technology variables when explaining HCI and its effects. For example, instead of attributing a positive computer-based learning outcome to a specific type of interactivity, it can be attributed to social presence that happens in predictable ways as a result of exposure to different forms of interactivity or other technological variables. Social presence has already been shown in a few HCI studies to mediate technology effects (e.g., Lee et al., 2005; Skalski & Tamborini, 2007). Contemporary social presence research is still in its infancy, however, and as mentioned, research thus far has tended to use different measures of the concept. This calls attention to the value of developing a standardized social presence measure, which can facilitate comparison across a variety of HCI technologies and effects. In addition to social presence, other individual difference and user variables, such as gender and personality characteristics (Reeves & Nass, 1996), may also play a part in social responses to computer technologies and also demand attention.

In terms of effects, the research highlighted in this section has focused on social responses to computers and educational outcomes of HCI. These are important areas, and the social responses work begun by Reeves and Nass (1996) in particular highlights fundamental aspects of HCI. Social responses to computers, along with the experience of social presence, underlie potential outcomes of HCI in educational contexts and beyond. Skalski and Tamborini (2007), for example, showed how interactive social agent technology may be used to create more positive attitudes and behavioral intentions toward a health issue. Other research has looked at the ability of presence to affect consumer persuasion (see chapter 6, this volume). It is not difficult today to imagine the use of HCI technologies for these and other outcomes, including companionship and personal assistance. In fact, many of these applications of computer technologies are with us today.

This section began by describing some imaginary manifestations of HCI like Hal 9000 and R2-D2, and on the technology side, these fantastic representations are closer than ever to becoming a reality. The Lee et al. (2005) study cited earlier, for example, examined the long-term effects of interaction with a robotic dog, the Sony Aibo. Findings

revealed clear linkages between social presence with the robot and positive social responses toward it. These types of responses should become even more pronounced in the future as robots increase in sophistication, and we may not be far from having our own R2-D2s. However, some see the downside of super advanced robots in society, inspired no doubt and the dystopian vision of HAL 9000 and science fiction creations such as the Terminator, and one Internet millionaire, Ben Way, has even started a firm called Weapons Against Robots (WAR) to develop anti-robot technologies for the future defense of humanity (Flynn, 2008). This may just be a publicity stunt, but it nevertheless points to the negative social presence that robots and other HCI applications have the potential to engender.

For now, the future of human-computer interaction seems bright. This section highlighted how humans have social responses to computer technologies and how these reactions produce generally favorable outcomes. Regular and widespread interaction with robots may be years away, but social interaction with computer technologies has become a ubiquity of modern life. GPS navigation systems, automated online help agents, virtual pets, video game characters, and personal computers themselves are a few of many potential sources of HCI today. These technologies and the social presence they create will be an increasingly fascinating and important area of inquiry in coming years.

CMC and Presence: Why the Internet?

As suggested above, computers have great potential to elicit social presence. The seemingly social, intelligent nature of a computer allows it to elicit feelings in users as if they responding to an actual intelligence. However, one major computer application that also allows people to feel more present is the Internet. As a large and amorphous channel, the Internet allows users to do a variety of things. The nature of the Internet allows for the potential for all three types of presence to occur. The main characteristic of the Internet that specifically increases the possibility for presence is the highly interactive nature of the medium.

Many different definitions of interactivity exist, but two definitions of highlight the differences in these definitions. Steuer (1992) defined interactivity as "the extent to which users can participate in modifying the form and content of a mediated environment in real time" (p. 84). This definition is more of a mass-communication definition, and brings to mind technologies such as video games, interactive TV, and virtual reality. The second definition of interactivity considered here is "an expression of the extent that in a given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchanges referred to even earlier transmissions"

(Rafaeli, 1988, p. 111). This definition is more in line with interpersonal communication, and brings to mind talking to other people (no matter the channel). Because the Internet combines aspects of both mass and interpersonal communication, both types of interactivity are possible using computers in this way. Thus, both of these types of interactivity highlight the increased potential of presence that computers can offer. The next sections will highlights some ways that computers, because of various Internet applications, can help foster feelings of physical, social, and self-presence.

Physical Presence

Marshall McLuhan (1962) believed that big changes were brought upon society by the proliferation of electronic media. He believed that electronic media were changing culture, and thus society at large, from individualism to a unified collective identity. As he later wrote, "As electrically contracted, the globe is no more than a village" (1964, p. 5).

Although he never explicitly discussed computers in his writings (Press, 1995), today the term "global village" is most often associated with the Internet. Interestingly, this is a traditional geographic metaphor used to describe something created electronically. However, this is by no means the only geographical metaphor utilized with computers and the Internet. Graham (1998) compiles many others, such as a "web*site*," "the information super*highway*," and "electronic *communities*," and also the old Microsoft tagline "*Where* do you want to go today?"

The use of these geographic metaphors suggests a conceptualization of the Internet as a "place." The term "cyberspace," originally popularized in Gibson's (1984) *Neuromancer* (although originally coined in an earlier (1982) Gibson story called *Burning Chrome*), again implies that what exists through the Internet is a thought of a place. As Sterling also pointed out:

> Cyberspace is the "place" where a telephone conversation appears to occur. Not inside your actual phone, the plastic device on your desk. Not inside the other person's phone, in some other city. *The place between* the phones.... Since the 1960s, the world of the telephone has cross-bred itself with computers and television, and though there is still no substance to cyberspace, nothing you can handle, it has a strange kind of physicality now. It makes good sense today to talk of cyberspace as a place all its own. (1992, p. xi)

The use of geographic metaphors for computers and the Internet and conceptualizing cyberspace as a place suggests that people are experiencing these virtual environments as actual environments, and thus,

experiencing a high level of physical presence. How do these virtual worlds accomplish this? First, it is important to note what these worlds generally look like. According to the Dave Chappelle sketch (Brennan & Chappelle, 2004), "What if the Internet was a real place," it would look like a place of dubious character. However, as Ketchum (1998) noted, online spaces often bear great resemblance to similar spaces in the physical world (so the "shady" nature of the Internet jokingly brought up by Chappelle may just be a reflection of our own shadiness).

One example of this is Second Life. Second Life is an online virtual world started in 2003 by Linden Labs that is completely created by its users, known as Residents (What is Second Life, n.d.). The world is presented in 3-D, and provides a place where people can virtually interact (through their avatar) with a virtual continent, full of businesses, entertainment, and other avatars. Second Life was designed to mimic the Metaverse, a concept created in Neal Stephenson's novel *Snow Crash* (Maney, 2007). Second Life has its own economy, universities have started holding classes there, and politicians have even set up campaign houses there.

The fact that these places look like actual places should help accomplish a sense of physical presence by increasing the chance of activating *mental models*, or cognitive representations of entities, situations, and events in real and imagined worlds (Roskos-Ewoldsen, Roskos-Ewoldsen, & Dillman-Carpentier, 2002). People have pre-existing images of places and other entities from their real-world experiences and these should facilitate their sense of presence in response to computer simulations (see chapter 5, this volume, for a more detailed discussion of this topic).

This suggests that computers, because of user's ability to create their own content, can aid in the creation of environments that, although exist only virtually, can be experienced as actual environments [interestingly, there is a relatively recent branch of geography called cyber-geography, with one major goal of "mapping" cyberspace (see http://www.aboutus.org/CyberGeography.org) As Negroponte (1995) said, "If I could really look out the electronic window of my living room in Boston and see the Alps, hear the cowbells, and smell the (digital) manure in summer, in a way I am very much in Switzerland" (p. 165). Although popular virtual reality systems have yet to be developed that can create this, by the same token, if I look out the electronic window of my computer screen, and see the world of Second Life, and feel as if I am in that world and respond to it as if what I see is actually happening, then I am very much in Second Life, and feelings of physical presence should be high.

As mentioned above, some of the virtual objects that people can interact with in Second Life are other avatars. This virtual interaction is a large part of this virtual community, and suggests that computers and the Internet also allow the potential for feelings of social presence.

CMC and Social Presence

Some early scholars of CMC suggested that interaction using compute
was only possible as impersonal, task oriented communication. Accor
ing to early formulations of social presence, intimate social interactio
would not be possible using the Internet (or at least would be very di
ficult). Social Presence Theory (SPT; Short, Williams, & Christie, 197
suggests that the degree of interpersonal interaction is a function of th
number of cues systems present in a given communication channel. Chan
nels with fewer systems available will allow for less social presence witl
an interaction partner, which results in less interaction. The interactio
that does exist in this situation would be more task-oriented as a result.

However, current thought on people's interaction using computers
makes it obvious that people can, and do, engage in intimate interper-
sonal interaction online, including relationship formation and mainte-
nance (e.g., Chan & Cheng, 2004; Mesch & Talmud, 2006; Merkle
& Richardson, 2000; Parks & Floyd, 1996; Parks & Roberts, 1998).
Some scholars even suggest that sometimes conditions exist in interac-
tion through computers that lead to even greater levels of socialness than
would exist in face-to-face interactions (dubbed hyperpersonal commu-
nication, Walther, 1996). How is this possible? It would seem that for
people to establish relationships using computers, they would need to
feel some levels of social presence when interacting with others using
this channel.

We know people use channels with few cue systems for interpersonal
interaction. In fact, interpersonal interaction is often cited as the biggest
reason for Internet use. Stafford, Kline, and Dimmick (1999) reported
that 61% of all e-mail usage was personal in nature. In line with this,
scholars have also found that people report feeling social presence using
such systems as e-mail (Tu, 2002) and IM (Harms & Biocca, 2004)
which contains a very limited number of cue systems.

First, as noted in the beginning of the chapter, social presence is con-
ceived as a psychological feeling. As Nowak and Biocca (2003) suggest,
social presence may have started as a technological concept, but it moved
into a focus on people, as discussed in other recent work on the topic
(e.g., Biocca, Harms, & Burgoon, 2003; Zhao, 2003). One approach
that may help explain how a system with limited cues can induce feel-
ings of social presence is Social Information Processing Theory (SIPT;
Walther, 1992).

Social Information Processing Theory

Social Information Processing Theory (Walther, 1992) assumes that
communicators make attempts to achieve communication goals in online
settings as much as in offline settings. When the lack of cues available in

an online setting presents obstacles to accomplishing their goals, users adapt their behaviors to the cues that are available. Thus, given enough time, people can utilize these circumventions to accomplish goals online just as well as they do face-to-face. SIPT focuses on the ways people overcome limitation of a technology instead of only focusing on the limitations of the technology (as SPT would do).

One metaphor that helps explain SIPT is to think of social information about a person like water in a glass. Online communication is like "sipping" from that glass of water, whereas offline interaction is like "gulping" from the same glass (Griffiin, 2006). Both methods can result in an empty glass, but "sipping" takes a longer time, just like interacting with someone online can result in achieving the same goals as interacting offline, but online takes longer to accomplish those goals..

A body of research exists suggesting that SIPT is a useful framework to study CMC in a variety of settings (i.e., Gibbs, Ellison, & Heino, 2006; Hobman, Bordia, Irmer, & Chang, 2002; Pena & Hancock, 2006; Tidwell & Walther, 2002; Utz, 2000; Walther & Bunz, 2005; Walther & Burgoon, 1992; Walther, Loh, & Granka, 2005; Walther & Tidwell, 1995). One part of research in SIPT examines what circumventions people use to overcome limitations of CMC and to accomplish their goals. These circumventions include the use of emoticons (Walther & D'Addario, 2001), chronemics (Walther & Tidwell, 1995) and using more and deeper questions and questions in an online interaction (Tidwell & Walther, 2002). In fact, things that can be considered circumventions such as emoticons (Na Ubon & Kimble, 2003), avatars (Nowak & Biocca, 2003), and location awareness systems (Licoppe & Inada, 2008) have been found to increase feelings of social presence as well.

A more recent potential addition to SIPT that has undertones of social presence ideas comes from recent work on electronic propinquity (Walther & Bazarova, 2008). As originally defined, electronic propinquity was "electronic presence" (Korzenny, 1978, p. 7) and can be thought of as "the psychological feeling of nearness that communicators experience using different communication channels" (Walther & Bazarova, 2008, p. 624). In this regard, electronic propinquity sounds very much like social presence. Consistent with the theory of electronic propinquity (Korzenny, 1978), Walther and Bazarova found that differences did not exist in reported electronic propinquity for users of a variety of channels when that channel was the only option. However, when options were available, text-only chat (a low bandwidth option) led to less electronic propinquity. Communication skills were the rationale offered for this finding, as those participants with higher skills were better able to achieve electronic propinquity, even in conditions of lower bandwidth and increased task difficulty. Walther and Bazarova conclude that skills are an important inclusion for SIPT, and indeed they (along

with channel options) seem important for feelings of social presence using computer technologies to interact with other people.

Computers may also be a prime place for experiencing social presence because, as Donath and boyd (2004) suggest "People are accustomed to thinking of the online world as a social space" (p. 71). Many of the most commonly used Internet applications, such as e-mail, IM, and social networking sites, are designed to foster interaction between two people. If, through the use of these technologies, people have become accustomed to thinking of this world as a social place and have developed the medium-specific skills (another relevant construct for the Theory of Electronic Propinquity (TEP); Korzenny, 1978) necessary to use these channels, it is possible that they have also become more accustomed to activating mental models when using these technologies. For example, when the first author interacts with his good friends over IM, he often visualizes them as he reads their messages, and sometimes hears their voices speaking the words as he reads them. In this way, he is experiencing the virtual actor (avatars and text on a screen) as the actual person behind those online representations and feels more socially present then. Furthermore, if people have an already established notion of how to respond to something in the actual world, and they see something that looks and seems like that in the virtual world, they are more likely to respond to it as they would in the actual world. In line with this, Yee, Bailenson, Urbanek, Chang, and Merget (2007) found that non-verbal norms that existed in offline society also existed among avatars in Second Life, suggesting that people are experiencing these virtual environments as they would actual environments, and thus feeling a sense of social presence.

Some recent systems have been developed to induce feelings of presence as well. These systems, falling generally under the category of teleconferencing systems, are designed to make users feel as if they are in the same meeting or class room, even if they are thousands of miles apart. As Gates (1999) said, "We need software that makes it possible to hold a meeting with distributed participants—a meeting with interactivity and feeling, such that, in the future, people will prefer being telepresent." This goal of making people feel as if they are together can be seen in Cisco's tagline in an ad for its TelePresence system: "Welcome to a network where being here is being there. Welcome to the human network." And it is the ability to connect humans that they are playing upon in their ad depicting a relief worker chatting with his family at home on other side of the globe. One study of these systems found that increasing the information the system provided (audio, audio-video, and avatar), compared to text only, increased the feelings of social presence (Bente, Ruggenberg, Kramer, & Eschenburg, 2008).

Social Presence in Educational Settings

Another area of study that demonstrates the ability of computers to enhance social presence is the educational realm. Social presence has been argued to be a necessary component to improving education, both in face-to-face and computer-mediated settings (Gunawardena, 1995). Low social presence is seen as decreasing interaction (Garramone, Harris, & Anderson, 1986) and increasing frustration while lowering affective learning (Hample & Dallinger, 1995).

Research on computers, social presence, and education falls into two major types: First, some studies examine what increases social presence in e-learning environments. Second, some research has looked at how social presence affects certain learning outcomes in e-learning environments.

Causes

Several studies examining the causes of social presence have focused on what channels increase it (very much in line with Social Presence Theory thinking). Results of these studies have been inconclusive. Tu (2002) found that e-mail and real-time discussion induced greater feelings of social presence in students than bulletin boards. Dirkin, Mishra, and Altermatt (2005) found that students reported higher levels of social presence in either a text-only or fully animated social agent condition compared to voice only or static image with voice conditions. Interestingly, it seems that students either wanted all or nothing in this study. Horner, Plass, and Blake (2008) compared lecture that contained video or not. They found that the inclusion of video had no impact on reported social presence. Overall, this research is not consistent with SPT predictions, as the inclusion of greater numbers of cue systems was not enough to increase social presence, and sometimes fewer cue systems led to increased social presence.

Other studies examining what increases social presence in educational setting has looked at ways that people create social presence within computer technologies. Very much in line with Social Information Processing Theory (Walther, 1992), Na Ubon and Kimble (2004) found that social presence accrues over time in online learning communities. Other research has looked at mechanisms people utilize (these can be thought of as circumventions in SIPT thought). Na Ubon and Kimble (2003) suggest that people use emoticons and capitalizations to express emotions and also used phatic, and these things have potential to lead to increased social presence. Tung and Deng (2007) found that children interacting with a dynamic avatar felt greater social presence than those interacting with a static one. Finally, Defino and Manca (2007) found that people

may use more figurative language to increase social presence. All of these are suggestions of how people may overcome the limitations of the channel and accomplish their goals (in this case, the goal of establishing a feeling of social presence).

Outcomes

Finally, research on social presence and e-learning has looked at outcome measures associated with education from increased social presence. Generally speaking, increased social presence has been found to be associated with increases in other positive educational outcomes. Increased social presence has been found to be associated with increased satisfaction for online learning (Lin, Lin, & Laffey, 2008) and course satisfaction and instrumentality (Johnson, Hornik, & Salas, 2008). Dirkin, Mishra, and Altermatt (2005) found that students in a text-only condition (which was one of the highest in social presence) had more positive interpretations of the class. Tung and Deng (2007) found that the use of dynamic emoticons, which led to higher social presence than static emoticons, also increased children's intrinsic motivations.

Overall, this research helps demonstrate the importance and the ability of social presence to exist using computers. It suggests that there are ways to overcome limitations of the channel, and that when people find them, they feel more socially present. This increase in social presence also leads to increases in other outcomes, such as positive learning outcomes.

Much of the social interaction that takes place over the Internet does so with systems that allow users to create some sort of online representation or profile for themselves. The use of a virtual self in these interactions draws attention top the possibility that people can experience feelings of self-presence.

CMC and Self-Presence

Computers offer unparalleled potential among popular media for the experience of self-presence. Applications such as online social networks like facebook.com allow users to create a sense of social presence with a variety of "friends," but they also allow users to put a version of their self into the medium. In fact, some scholars argue that the online self people can create in such worlds may be more of a "true" self than the physical self is (Bargh, McKenna, & Fitzsimmons, 2002).

One of the hallmarks of the Internet, and thus computers, is that they allows for a great amount of potential for self-generated content (Kelly, 2005), much more so than other popular media such as television and even video games. Indeed, much of this user-generated content is

comprised of users creating profiles of themselves. Creating a profile of oneself online is a main part of social networking sites (Donath & boyd, 2004) such as facebook.com and myspace.com. These sites allow users to create a profile of themselves and thus a "self presence" in the virtual world.

No published articles were found explicitly looking at self-presence and the Internet/computers. This is not surprising, as self-presence has been identified as the least explored type of presence overall (Tamborini & Skalski, 2006). However, there is some literature that speaks to the power of the Internet to promote feelings of self-presence, i.e., experiencing one's virtual self as one's actual self. It is interesting to note that this definition of self-presence is very similar to clinical identification, defined as "the process in which one individual takes on the behaviors, values, or goals of another" (Cramer, 2001, p. 667). In the case of self-presence, it may be that the other that one is taking on the experience of is one's virtual self.

Sherry Turkle (1984) has long maintained that the Internet can be used to allow people to play through different identities. Using Multi-User Dungeons (MUD; not an incredibly popular medium today, but one that can seen as a forerunner to today's MMORPG's), she demonstrated how her patients could create online identities and work on psychological issues they had through those identities. For example, Turkle (1994) tells the story of Peter, a shy person who had issues meeting women at his college. However, in a MUD, he was able to create a character named Achilles, a heroic warrior who was able to meet and talk to the most desired female character in the virtual world. In this way, Peter is experiencing his virtual self and his actual self, even if only during the time he spent playing the game (up to 40 hours a week). However, rather than just being an exercise that only elicits effects online, people also transfer this identity play into their actual self. In this way, her patients used their virtual selves as themselves and experienced their virtual selves as themselves (because the avatars were themselves).

Jeremy Bailenson and his colleagues have also contributed a line of research that suggests that people can and do treat their virtual selves as their actual selves. Presenting this research under the title of "Self Presence" (Bailenson, 2008), he and his team have consistently demonstrated that people do respond to their virtual selves as their actual selves. They label one example of this the "Proteus Effect" (Yee & Bailenson, 2007). The main idea of the "Proteus Effect" is that people will behave in a stereotypic manner expected of their virtual representation. Yee and Bailenson (2007) have demonstrated this effect with both attractiveness and height. A similar effect was found using elderly avatars (Yee & Bailenson, 2006), which was found to reduce negative stereotyping of elderly. Another study found that males (used the most words) and

females (used the fewest words) behaved in a more stereotypic manner when they were given opposite sex avatars in a World of Warcraft game environment (Grundnig, Petri, Polzer, Strafling, & Kramer, 2008). These studies show that people take on characteristics of their virtual self, and, even if only momentarily, treat their virtual selves as themselves, suggesting that they are engaging in self-presence.

Overall, this literature suggests that people put themselves online. It also suggests that the representations that people choose for themselves (or are chosen for them) have the potential to be experienced as the actual self (and in some cases may be a part of the actual self manifested online). More research is necessary to examine both how computers can help foster a sense of self-presence, and how the experience of self-presence impacts those experiencing it.

The Future of Presence and Computers

This chapter has addressed ways in which computers, and some of their most common uses, can help foster a sense of presence. Due to some of their characteristics and uses, computers may actually be the most presence-inducing technology, especially for social and self-presence. However, there are scholars that believe that computers may only be scratching the surface of their potential today. In the future predicted by some of these scholars, technologies brought about by computer expansion will lead to the creation of what will become the ultimate presence inducing technology.

Key among these scholars is Ray Kurzweil. His key ideas, from 1999 are as follows: First, computing power is growing at an exponential rate. Because of this exponential growth, he predicts that by 2020, a $1,000 computer will match the computing speed and capacity of the human brain. As this computing power increases, and computers eventually exceed human capabilities, we will look to increasingly meld ourselves to our technology. As Kurzweil puts it, "*We will be software, not hardware*" (p. 129). In today's ideas, this can be thought of as a push to leave our physical bodies behind, and instead to download our intelligence into the Internet. This will be possible, according to Kurzweil, because as brain mapping becomes more sophisticated, and more knowledge is gained about what electrical impulses do what, the human brain will effectively be reduced to an electric map, which can be replicated by exponentially more powerful computer technology of the future. As Morpheus also says in the movie *The Matrix*, "If real is what you can feel, smell, taste and see, then 'real' is simply electrical signals interpreted by your brain creating a matrix type world." Kurzweil's (2005) term for this "matrix type world" is the Singularity (which he now says is "near"). If the Singularity does come to pass as Kurzweil predicts, this

will be the ultimate demonstration of the presence power of computers, as it will allow humans to become entirely present, leaving their physical bodies behind and becoming a ghost in the machine.

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