Reconceptualizing Presence:

Differentiating Between Mode of Presence and Sense of Presence

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Summary

The concept of mode of presence is introduced in this paper to address a flaw in the current conception of presence, namely, the equating of presence with sense of presence. Presence is redefined as consisting of two essential dimensions: the mode of presence that structures the physical relationships between the perceiver and the environment, and the sense of presence that constitutes the subjective experience of the perceiving individual in the given environment. This new conceptualization explains different types of sense of presence in terms of different modes of presence, and calls for the development of mode-specific measures of sense of presence.

1. Introduction

Since the publication of the MIT journal, *Presence*, ten years ago, we have learned a great deal about the phenomenon of presence and ways of measuring it (Lombard and Ditton, 1997). Different subtypes of presence have also been identified. The two most important ones are telepresence and virtual presence (Held and Durlach, 1992; Sheridan, 1992). However, some basic issues still remain unresolved. For example, what is the

nature of presence? What are the factors that determine presence? What distinguishes between telepresence and virtual presence? We probably will never reach a complete consensus on all these issues, but awareness of the disagreements and the effort to resolve them will surely enhance our understanding of these issues and increase our knowledge of presence.

In this paper, I want to address what I see as a flaw in the current conceptualizations of presence, namely, the equating of presence with sense of presence. This misconception has hampered research into the cause of the differences in subtypes of presence. As a way of dealing with this problem, I will introduce the concept of mode of presence that describes the condition in which a given type of sense of presence is produced. Presence is thus regarded as consisting of two essential elements: the mode of presence that structures the physical relationships between the perceiver and the environment, and the sense of presence that constitutes the subjective experience of the perceiving individual in the given environment. This new conceptualization explains different types of sense of presence in terms of different modes of presence, and calls for the development of mode-specific measures of sense of presence. In what follows I will first examine the related problems in the current conceptions of presence; I will then propose the new conceptualization of presence; and finally I will discuss the implications of the new conception for presence research.

2. Problems in Current Conceptions of Presence

Presence has been currently defined as the subjective experience of being in an environment, which is further divided into telepresence - the experience of being in a remote environment - and virtual presence - the experience of being in a computer-generated environment (Witmer and Singer, 1998). These definitions can be traced back ten years to the initial categorizations of presence offered by Sheridan at the inception of the MIT presence journal. Sheridan (1992, p. 121) defined presence as the "subjective sensation" of being present with environmental objects, telepresence as "feeling like you are actually 'there' at the remote site of operation," and virtual presence as "feeling like

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you are present in the environment generated by the computer." Sheridan's influence on the conceptualization of presence has been twofold. First, he provided for the field a definition that equates presence with sense of presence or "mental workload." Second, he articulated a conceptual distinction between telepresence and virtual presence, a bifurcation that has since been widely accepted.

There are some problems in Sheridan's conception of presence, however. For example, Sheridan failed to offer a separate category of presence for the experience of being in a proximal physical environment where no technological mediation is needed. Moreover, inconsistent with his emphasis on the centrality of subjective sensations, Sheridan distinguished between telepresence and virtual presence according to the physical characteristics of the environment (e.g., geographical proximity and computer animation) rather than the subjective experiences of the perceiver. To resolve this apparent inconsistency, Steuer (1992) has offered a modified conception of presence. Based on Sheridan's notion of presence, Steuer dichotomizes the subjective experience of "being there" into *presence* - the "natural perception" of an immediate physical environment - and *telepresence* - the "mediated perception" of an environment that can be either "a distant real environment" or "an animated but nonexistent virtual world" (1992, p. 76). In other words, Steuer seeks to collapse the two subtypes of presence Sheridan developed, stressing instead the subjective experience common to both teleoperation and virtual reality. In so doing, Steuer has in fact created a new bifurcation of presence: (1) "natural" sense of presence, and (2) "mediated" sense of presence.

The question is then this: What accounts for the distinction between "natural perception" and "mediated perception"? Steuer's own description of these two categories suggests that the determining factor is the characteristics of the environment. While natural perceptions arise from the "immediate physical environment," mediated perceptions are gained in a "distant real environment" or an "animated but nonexistent virtual world." Thus, like Sheridan's categorization, Steuer's modification ends up calling for the examination of the environmental conditions in which a given type of sense of presence is produced.

Another problem in the current conceptions of presence is the way the distinction between actual presence and virtual presence has been made. Actual presence has been commonly defined as the sense of presence achieved in a real environment, and virtual presence as the sense of presence achieved in a virtual environment, with "real environments" being identified with physical objects and "virtual environments" with computer simulations (Zahorik and Jenison, 1998). Such identifications prove to be rather problematic. For one thing, physical objects, such as paintings and sculptures, can be used to create virtual environments capable of evoking feelings of being present with things that are in fact not present. For another, electronically created objects are not necessarily "virtual." For example, the electronic images and sounds produced in a movie are just as real to a movie producer as the protruding rocks on a cliff to a mountain climber. Whether an object is actual or virtual largely depends on the meaning it has for the perceiver, and the intention of the perceiver must therefore be taken into consideration when defining presence.

3. Proposed Reconceptualizations

The above review suggests that a good conception of presence needs to take into account both the subjective experience of the perceiver and the characteristics of the environment in which the perceiver is located. To integrate these two elements, I propose that we receonceptualize presence as comprising two key dimensions: sense of presence and mode of presence, with the latter being subdivided into proximal presence, remote presence, and virtual presence. The characteristics of the environment, the intention of the perceiver, and the media technologies used by the perceiver together determine the mode of the perceiver's presence in an environment, which in turn shapes the sense of presence the perceiver achieves.

In an important footnote to the definition of the perception of being in an environment, Steuer (1992, p. 75) points out that the subjective experience of presence is essentially determined by the way "in which sensory input impinges directly upon the organs of

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sense." This definition of presence thus excludes delusions caused by non-environmental factors such as illness and medication. Using the relationship between external stimuli and perceiver's sense organs as a key criterion, I define sense of presence and mode of presence as follows.

Sense of presence is the subjective experience of being present in an intended environment outside one's body, which is produced through the impinging of external sensory stimuli upon the sense organs of the perceiver. *Mode of presence* is the physical condition in which the sensory stimuli of the intended external environment impinge upon the sense organs of the perceiver. Depending on how the sensory stimuli of the intended environment reach the sense organs of the perceiver, three distinctive modes of presence can be identified. *Proximal presence* is a condition in which the stimuli of the intended environment directly press upon the sense organs of the perceiver. *Remote presence* is a condition in which the stimuli of the intended distant environment are transmitted in real time through a communication medium to a proximal environment, which presses the transmitted stimuli upon the sense organs of the perceiver. *Virtual presence* is a condition in which the stimuli of a proximal environment created by a presence medium in simulation of the intended environment, which is either inaccessible or nonexistent, press upon the sense organs of the perceiver.

Figures 1a, 1b, and 1c illustrate these three modes of presence and their corresponding sense of presence. Figure 1a shows the structure of proximal presence, which is unmediated. "Intended environment X" can be a place, an object, or a person the perceiver intends to reach and experience. The circle represents the perceiving individual. The arrow runs through the circle, indicating that the sensory stimuli of the intended environment directly impinge upon the sense organs of the perceiving individual, which gives the individual a sense of presence in the environment. A key condition of this mode of presence is that the perceiving individual must be located in close physical proximity to the intended environment such that the sensory input from the environment can be received by the individual with naked senses (Goffman, 1963), i.e., without technological mediation.

Figure 1b shows the structure of remote presence. In this case, the intended environment is located outside the perceptual range of the naked senses of the perceiving individual, whose sense of presence in the intended remote environment is achieved through the mediation of a communication technology. The technology transmits in real time the sensory stimuli of the intended remote environment to a proximal environment in which the transmitted stimuli are directly pressed upon the sense organs of the perceiving individual. The communication medium thereby enables the perceiver to achieve a sense of simultaneous presence in a remote environment without physically being there.

A communication medium consists of (1) a *conduit device* that allows information to travel across distances and (2) an *interface device* that allows users to send and/or receive information. The combination of these two devices forms a communication linkage that relays to the users the sensory stimuli of a remote environment. Examples of such media are the telephone, television, radio, and the Internet Relay Chat (IRC).

Depending on whether the technology allows for interaction between the user and the intended remote environment, remote presence can be divided into two subtypes: telepresence (Minsky, 1980) and telecopresence (Zhao, 2001). *Telepresence* is a form of non-interactive or one-way remote presence, as it only enables users on one side of the communication linkage to extend their sensory reaches to the other side. Telescopes, radio and television are examples of telepresent communication media. *Telecopresence*, on the other hand, is a form of interactive or two-way remote presence, which allows users on both sides to extend their sensory reaches to each other simultaneously. The telephone, the IRC, and the videoconference are examples of telecopresent communication media.

Figure 1c shows the structure of virtual presence. Under this condition, the intended environment is either inaccessible for reasons of time, distance, and cost or nonexistent as in the case of science fictions, fairy tales, and historic legends. However, a simulation of the environment is produced by a presence medium that presses the sensory stimuli of the

simulated environment upon the sense organs of the perceiver. These stimuli provide the perceiving individual with a sense of presence in an intended environment that is in fact physically not present (Biocca, 1992).

A *presence medium* is a technological system that enables the users to experience an intended environment, which is not concurrently present, by generating sensory stimuli that resemble those of the intended environment (Zhao, forthcoming). A presence medium also consists of two main components: (1) a *presentational device* that produces desired sensory stimuli and (2) a *simulated environment* generated by the medium-induced stimuli (as opposed to the transmitted stimuli in remote presence). Through experiencing these stimuli, users of the presence medium feel virtually present in the intended environment, which may not even exist in the real world. Following are some examples of such media. The projector, film, screen, lights, etc. constitute the presentational device needed to show a movie, and the images and sounds produced by the device constitute the simulated environment that evokes a sense of being present in an intended scene. A science fiction book is a presentational device, which generates a fictional tale describing an intended situation. A sculpture is also a presentational device, which projects an image that represents an intended figure.

In the literature, as mentioned before, virtual presence has been confined to only computer-generated environments (Mantovani and Riva, 1999). The proposed conception removes this limitation. There are many different kinds of presence media, which can be roughly grouped into three categories: physical, electronic, and verbal. *Physical presence media* create the simulated environment by using physical materials that project images resembling the intended environment. Examples of such media are paintings, sculptures, and performing arts. In the case of paintings, the pictures mirror the actual objects; in the case of sculptures, the figures represent their real-life counterparts; and in the case of performing arts, artistic movements depict the real happenings. *Electronic presence media* create the simulated environment by producing electronic stimuli that generate sensations similar to those one would receive in the intended environment. Advances in virtual reality technologies have made it possible to

produce an electronically simulated environment that immerses the perceiver's multiple senses. Examples of the electronic media include audio tapes, video games, and IMAX movies. Finally, *verbal presence media* create the simulated environment through oral or written narration that describes the intended environment. These verbal stimuli provide the audience with a sense of presence in the intended environment.

(Figures 1a, 1b, 1c about here)

It must be noted that a person perceives two separate environments simultaneously in either remote or virtual presence: the proximal environment (labeled Y in Figures 1b and 1c) in which the person perceives presence without mediation, and the transmitted or simulated environment (labeled X' in Figures 1b and 1c) in which the person perceives presence through mediation. By shifting the focus of attention, a person is able to move back and forth between these two environments. However, future development of the immersive technology may succeed in isolating the perceiving individual from the surrounding proximal environment, thus forcing the person to focus solely on the mediated environment (Lanier and Biocca, 1992).

4. Implications of the New Conception

Incorporation of the concept of mode of presence into the conceptualization of presence has several important implications for presence research. First of all, the subjective experience of being present in an environment is no longer seen as entirely subjective; instead, it is regarded as a function of the relationships between the perceiver and the environment, as well as the media technologies the perceiver uses to negotiate with the environment. Depending on the mode of presence a perceiver assumes in an environment, the perceiver achieves a certain type of sense of presence.

In the condition of proximal presence, the perceiving individual receives redundant sensory inputs from the intended surroundings through naked senses, and the stimuli received evoke a strong and rich sense of being present in the immediate environment. In the condition of remote presence, the sensory inputs received by the perceiving individual

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through technological mediation are perceptually less rich, ranging from text only to audio or visual only to both audio and visual. Efforts have been made to increase the channels of perceptual contact in remote presence, but it will probably be a while before remote presence can approximate proximal presence in perceptual richness (Lanier, 2001). The sense of being present in the intended environment the perceiver achieves in the condition of virtual presence is also perceptually less rich than its counterpart in proximal presence. Many traditional presence media are single-stimulus media that influence the perceiving individual through only one sensory channel. A picture, for example, affects only the visual sense and an audio tape only the auditory sense. Many new presence media are, however, designed to influence more than one sense organ. Television affects both auditory and visual senses, video games involve auditory, visual, and tactile senses, and a much richer sense of presence can be achieved by immersing multiple senses of the perceiver using virtual reality technologies.

Second, the distinction between mode of presence and sense of presence makes it possible and necessary to examine the match between the intended environment and the perceived environment. In proximal presence, the perception of an environment is usually assumed to automatically match the environment being perceived, as is reflected in the saying of "seeing is believing." This assumption, however, is not always correct, for human perceptions are also internally mediated by autonomic and psychological factors, which may introduce "perceptual errors." In remote presence, in addition to the type of internal mediation mentioned above, the perception of being present in the intended environment is affected by the communication medium, which not only transmits but also presents the remote stimuli to the perceiver. Such technological mediation may alter the stimuli coming from the intended environment. In virtual presence, the perception of being present in the intended environment generated by a presence medium is normally compared with a prior experience or a preconceived notion of realism pertaining to the intended environment. In all of these cases, the "accuracy" of the achieved perception can be evaluated by comparing to the intended environment.

Third, although there are common factors underlying all presence measures, such as perceptual richness and fidelity, it is necessary to develop mode-specific measures of sense of presence. Perceptual realism, for example, is not applicable to the measure of the experience of remote presence, for in remote presence the perceiver operates under the assumption that what is being experienced is real in the sense that the stimuli are transmitted over live from a remote and actual environment. To ask a telephone caller to evaluate the realism of a call he or she just made would not make a lot of sense because it would contradict the assumption held by the caller: the call was a real call to a real person. On the other hand, perceptual realism is a useful criterion for evaluating the experience of virtual presence, where the perceiver is fully aware that what is being experienced is not real in the sense that the stimuli are generated by a presence medium, rather than the intended actual environment. It will therefore make sense to find out the extent to which the simulated environment is perceived to resemble the intended actual environment.

Fourth, the differentiation between mode of presence and sense of presence enables us to talk about the issue of deception in technological mediation. A deception is defined here as a situation in which the medium provider intentionally creates a discrepancy between the user's sense of presence and the actual mode of presence the user is in. For example, an online chat room provider may trick the users into believing they are chatting with real people by deploying sophisticated chatter bots. Likewise, a chat site may claim that the site is hosted by an Eliza-like program (Weizenbaum, 1966), but it is in fact directed by a real person behind a lifelike avatar. In the first case the user is under the illusion of remote presence, and in the second case the user is under the illusion of virtual presence. In the absence of concepts like mode of presence, the issue of deception cannot be fruitfully discussed.

5. Conclusion

In this paper I have made a critique of the current practice of equating presence with sense of presence, and proposed a new conceptualization as a solution to this problem. I

have introduced a distinction between mode of presence and sense of presence and shown that this reconceptualization not only enables us to explain different types of sense of presence, but also justifies the need for us to develop mode-specific measures of the experience of presence. This new conceptualization will also enable us to address issues like deception in mediated presence.

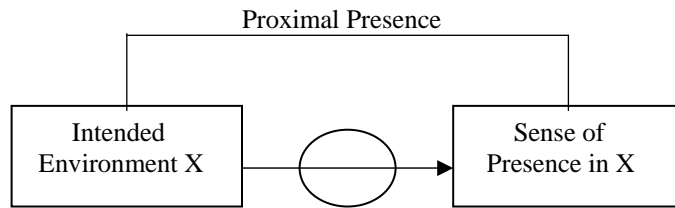Figure 1a. Unmediated Proximal Presence

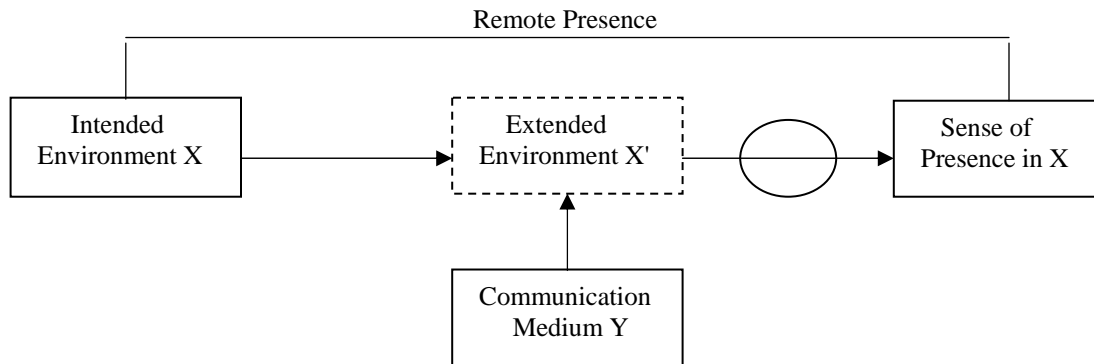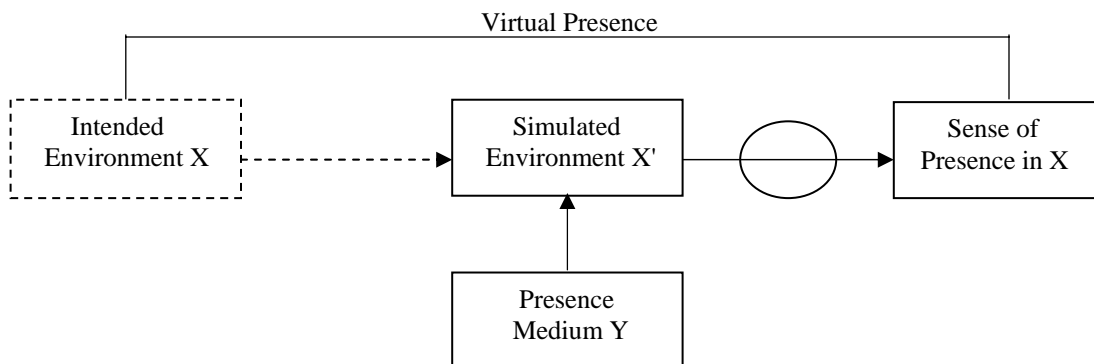Figure 1b. Remote Presence via a Communication Medium

Figure 1c. Virtual Presence via a Presence Medium

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