Editorial

Presence: Where Are We?

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IN 1978, THE PHILOSOPHER DANIEL DENNETT presented us with an interesting and entertaining thought experiment entitled "Where am I?" as the last chapter of his *Brainstorms* book.[1] Dennett recounts the story of a "curious episode" in his life where his brain got surgically separated from his body, with each connection between them restored by placing two "microminiaturized radio transceivers" between each input and output pathway. After the operation he, or rather his body, goes to visit his brain, which was placed, in keeping with the best philosophical traditions, in a life-support vat. While looking with his own eyes at his own brain he starts to wonder:

> Being a philosopher of firm physicalist conviction, I believed unswervingly that the tokening of my thoughts was occurring somewhere in my brain: yet when I thought "Here I am," where the thought occurred to me was *here*, outside the vat, where I, Dennett, was standing staring at my brain. (p. 312)

Dennett reasons that the location of the "I" he was referring to in the question "Where am I?" may be related, though not identical, to his *point of view*. He states:

> Point of view clearly had something to do with personal location, but it was itself an unclear notion. It was obvious that the content of one's point of view was not the same as or determined by the content of one's beliefs or

thoughts. For example, what should we say about the point of view of the Cinerama viewer who shrieks and twists in his seat as the roller-coaster footage overcomes his psychic distancing? Has he forgotten that he is safely seated in the theater? Here I was inclined to say that the person is experiencing an illusory shift in point of view. In other cases, my inclination to call such shifts illusory was less strong. The workers in the laboratories and plants who handle dangerous materials by operating feedback-controlled mechanical arms and hands undergo a shift in point of view that is crisper and more pronounced than anything Cinerama can provoke. (pp. 314–315)

What Dennett calls "an illusory shift in point of view" nicely conceptualizes the central idea of presence. His examples of this illusory shift are well chosen. Cinerama, which debuted at the Broadway Theatre, New York, in 1952, was one of Hollywood's answers to the growing popularity of television in the early fifties and the resulting decline of sales at the box office. Cinerama used three 35-mm projections on a curved screen to create a 146-degree wide panorama. In addition to the impressive visuals, Cinerama also included a 7-channel directional sound system that added considerably to its psychological impact. The ads for "*This is Cinerama,*" the first Cinerama film, containing the famous scene of the vertigo-inducing roller-coaster ride, promised: "You won't be gazing

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at a movie screen—you'll find yourself swept right into the picture, surrounded by sight and sound." The film's program booklet proclaimed[2]: "Everything that is happening on the curved Cinerama screen is happening to you. And without moving from your seat, you share, personally, in the most remarkable new kind of emotional experience ever brought to the theater." Phrases such as these were used quite often to promote the immersive and multisensory cinema formats of the 1950s, including 3D cinema (e.g., "It happens to YOU in three dimensions"), Todd-AO ("Suddenly you're there . . . "), CinemaScope, and other formats.[3] Although such statements were sales pitches of the films' marketing people, they do illustrate the fact that the aim of the cinema experience was to enhance the film's psychological impact and entertainment value by making the viewer feel part of the movie. The once passive viewer became an "active" participant. As Slater and Wilbur[4] put it, with reference to virtual environments, the "discontinuity between the place of our current reality and the reality showing through the display" seemed to be collapsing.

However engrossing noninteractive systems may become, a number of authors regard the possibility of real-time *action* at a distance or in virtual space as key to achieving a sense of presence. Dennett[1] also states that interactive teleoperation engenders a "shift in point of view that is crisper and more pronounced than anything Cinerama can provoke." The design goal of smooth and intuitive teleoperation of remote-controlled manipulators (e.g., robot arms) and vehicles triggered a considerable research effort in the area of human factors,[5,6] which lies at the root of today's presence research. In fact, the term *telepresence* was first used in the context of teleoperation by Marvin Minsky (suggested to him by his friend Pat Gunkel) in his classic 1980 paper on the topic.[7] Minsky's paper was essentially a manifesto to encourage the development of the science and technology necessary for a remote-controlled economy that would allow for the elimination of many hazardous, difficult or unpleasant human tasks, and would support beneficial developments such as the creation of new medical and surgical techniques, space exploration, and tele-working. He writes:

The biggest challenge to developing telepresence is achieving that sense of "being there." Can telepresence be a true substitute for the real thing? Will we be able to couple our artificial devices naturally and comfortably to work together with the sensory mechanisms of human organisms? (Minsky[7], p. 48).

These questions are still valid today. Although the remote-controlled economy didn't arrive in the way Minsky envisioned, the development of telepresence technologies has significantly progressed in the various areas he identified. In addition, the arrival and widespread use of the internet brings us remote access to thousands of homes, offices, street corners, and other locations where webcameras have been set up.[8] In some cases, because of the two-way nature of the Internet, users can log on to control a variety of telerobots and manipulate real-world objects (see, e.g., Ken Goldberg's Tele-Garden: http://www.usc.edu/dept/garden/).

In normal, daily life we are seldomly aware of our sense of presence, or feeling of "being there," in the world. It is not an experience we are used to reflecting upon. As conscious and awake perceivers we have little doubt of the visible three-dimensional world which extends in front of us, and that we are part of this space. It may take something like an altered psychological state (e.g., a dream or hallucination), a leap of the imagination (like Dennett's thought experiment), or a mediated perception (through, e.g., cinema) to make us become aware of this "default" experience. With the advent and improvement of immersive displays, computing and network technologies, and interactive computer graphics, we can create more accurate reproductions and/or simulations of reality than were possible previously. This makes us increasingly aware of the relevance of the presence concept for the design and evaluation of media experiences.

It seems fair to say that the concept of presence has today become common currency in areas such as virtual environments, advanced broadcast and cinematic displays, teleoperation systems, and advanced telecommunication applications. Since the early 1990s, a growing community of multidisciplinary researchers has turned its attention to presence, looking at what causes it, how the experience may be

measured, and what effects it has on the media user. There is consensus that the experience of presence is a complex, multidimensional perception, formed through an interplay of raw sensory data (sensations) and various cognitive processes—an experience in which attentional factors play a crucial role as well. Despite considerable progress, presence research is still very much in its infancy, with a number of unresolved issues that set the research agenda of the presence community. A number of these issues are listed below:

- The *structure of presence* is still largely unclear. For example, is it an all-or-none or a graded experience? What are its psychological dimensions? Recent factor analytic studies are starting to shed light on this issue.
- Although a number of conceptual models of presence have been proposed to date, there is no generally accepted *explanatory model of presence*.
- *Measuring presence* in a way that is reliable, valid, and robust is still a major challenge, although this issue is currently receiving considerable attention from various research labs on both sides of the Atlantic
- A number of potential *determinants of presence* have been identified, and some have been experimentally validated. Their relative contributions and interactions are still largely unclear, however; an issue that also depends upon the development of suitable measurement methodologies.
- The *effects of presence* are to a large extent still unclear. For example, under what circumstances does an enhanced sense of presence aid task performance, or learning and memory?
- What are relevant *individual differences* with respect to presence, and what impact do they have?
- What will be the *social consequences* of the introduction of certain high-presence technologies at work or in the home? In which contexts of use will presence be of most value? How does presence relate to basic human needs such as privacy, control, and social contact?

In fact, the defining characteristics of the concept itself are still being discussed, as is evidenced by recent debates at the Presence Workshops and on the PRESENCE-L listserv (http://nimbus.temple.edu/~mlombard/Presence/listserv.htm), as well as by a number of contributions to the current Special Issue of *CyberPsychology & Behavior*. Presence is used in different ways by different scholars, each looking at the concept from their own perspective, applying their own emphasis or using their own specific definition. Lombard and Ditton[9] reviewed a broad body of literature related to presence and identified six different conceptualizations of presence: realism, immersion, transportation, social richness, social actor within medium, and medium as social actor. Based on the commonalities between these different conceptualizations, they provide a unifying definition of presence as the "perceptual illusion of nonmediation"; that is, the extent to which a person fails to perceive or acknowledge the existence of a medium during a technologically mediated experience.

The different conceptualizations of presence identified by Lombard and Ditton can roughly be divided into two broad categories—physical and social.[10] The physical category refers to the sense of being physically located in mediated space, whereas the social category refers to the feeling of being *together*, of social interaction with a virtual or remotely located communication partner. At the intersection of these two categories, we can then identify "co-presence" or a sense of being together in a shared space,
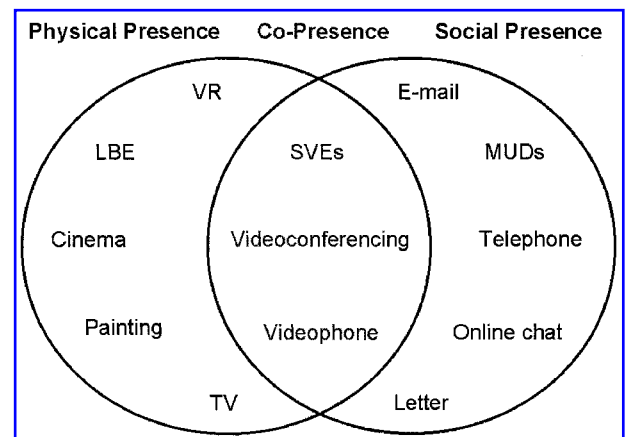
FIG. 1. A graphic illustration of the relationship between physical presence, social presence, and co-presence, with various media examples. Abbreviations: VR = Virtual Reality; LBE = Location-Based Entertainment; SVEs = Shared Virtual Environments; MUDs = Multi-User Dungeons.

combining significant characteristics of both physical and social presence. All three types of presence are addressed in the current issue of *CyberPsychology & Behavior.* Fig. 1 illustrates their relationship with a number of media examples that support the different types of presence to a varying extent. For example, while a painting may not necessarily support physical presence to any great extent (although trompe l'oeil and panorama paintings are examples to the contrary), interactive virtual reality (VR) technology has the potential to engender a high sense of physical presence.

This special issue of *CyberPsychology & Behavior* is dedicated to presence research and gives a good impression of the wide range of topics the research community is working on today, reflecting the breadth of the presence concept itself. The majority of papers included in this issue were originally presented at the 2nd International Workshop on Presence (University of Essex, UK, April 1999) or at PRESENCE 2000—3rd International Workshop on Presence (Delft University of Technology, The Netherlands, March 2000).* These papers, as well as other papers presented at these conferences, are to a large extent still available online via the conference websites (http://www.essex. ac.uk/psychology/tapestries and http://www. presence-research.org/presence2000.html). To provide a more permanent record, a CDROM has appeared, containing all papers of PRESENCE 2000, as well as the majority of papers from the two previous presence workshops. At the time of this writing a fourth workshop is planned for 21–23 May 2001, at Temple University, Philadelphia PA, USA (http://www. temple.edu/presence2001/).

It will likely be some time before simulations and/or reproductions of reality will provide the level of realism and interactivity required to make us pose Dennett's "Where am I ?" question from a slightly different perspective, trying to distinguish between reality and virtuality. However advanced such systems eventually

may become from a technological point of view, the social acceptance and uptake (and consequent commercial success) will depend to a large extent on users' experiences and responses toward them. It is here that research into presence and other user-centered concepts (e.g., usability, flow, affective responses) is of particular importance, since it has the potential to help us move beyond a technology-push approach, and ask questions concerning *purpose* and *context of use*. These questions are essential to the success of any human-centered technology.

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*These workshops followed on from the First Workshop on Presence, hosted by BT Labs in June 1998. Selected papers from this workshop were published in *Presence: Teleoperators and Virtual Environments* 9(2), 1999.

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