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# Presence and Mediated Spaces: a Review

Lucia A. Renò[♠♦]

[♦] Department of General Psychology,
University of Padova, Italy

**ABSTRACT**

The aim of this work is to present a review of presence in mediated spaces, namely those spaces experienced through the use of technologies. First, a distinction will be proposed between studies focused either on physical or human space, single or multiple inhabitation. Then, the way in which spatial issues are connected to presence will be described. Finally, some controversies on the nature of Mediated Space (MS) will be briefly mentioned, and how they are connected to the research areas previously identified.

Keywords: *mediated space, human space, physical space, spatial presence, place.*

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## 1. Introduction

There are many situations in which people feel they are in a technologically-mediated space, which is a space the user experiences through the use of technological devices. Examples include: navigating in a virtual environment; being a character in communities such as MUDs (Multi User Dungeons) or MOOs (Object Oriented MUDs)[1]; participating in a video-conference; communicating through a video-telephone; playing a video-game.

The aim of this work is to review in the area of presence in mediated spaces. First, a distinction in emphasis will be reported between physical and human space on the one side, and single versus multiple Inhabitation on the other. Then, the way in which spatial issues are connected to the "presence" concept will be described. Finally, some controversies on the nature of Mediated Space (MS) will be briefly mentioned, including realism, homogeneity, dematerialization.

[♠] Corresponding Author:
Lucia A. Renò
Departement of General Psychology,
University of Padova, Italy.
E-mail: lucia.reno@gmail.com

[1] "*MOOs and MUDs … are software created environments. The software and databases reside in server computer connected to large networks … Users or players connect or 'jack in' from remote network sites… choose characters for their virtual identity, a name with an associated descriptions. Participants are then presented with a scene, described textually, which establishes the user's location in the MOO.*" (Gaitenby, 1996, p.139).

## 2. The Mediated Space (MS)

Technology can help overcome some limits on human activity, by replacing and/or enhancing the resources available to support it[4] or, in other words, to 'mediate it'. Application fields abound, from medicine to psychology (therapy, diagnosis, rehabilitation, and prevention), from scientific visualization to architectural and engineering design, communication, marketing, advertising, organization and work, entertainment and gaming. In response to the broad use of technology in everyday life, research interest has been directed towards the study of mediated space. The nature (human or physical) and the number of users inhabiting MS may vary considerably, creating differences that will be described in the following sections.

### 2.1 Physical and Human Space

Even if MS is rarely conceptualized explicitly, studies position themselves varyingly on a continuum with a *physical* and a *human* conception of space at the extreme poles. This continuum partly reflects the distinction between "space" and "place" introduced in human geography. Here, 'physical space' means a focus on geometry, metrics, spatial configuration, the relative location of objects that for Casey (2001) describes space; 'human space' has to do with affective, socio-cultural aspects of an environment, similar to the notion of place (Adams, Hoelscher, & Till, 2001; Casey, 2001). Research dealing with physical space includes:

- Studies with the mediated environment as a faithful or a realistic re-creation of natural environments. In the field of spatial navigation, Colle and Reid (1998), giving participants the capability to move about in a three-dimensional space, maintain that the similarity of MS with natural space is an important element in the users' spatial navigation and orientation. In architectural and engineering design, Hirose, Takahashi, Koshizuka, Morinobu, and Watanabe (1996), showing an alternative way to generate virtual worlds, consider virtual spaces as a truly realistic reproduction of real environments. Rinalducci (1996) argues that virtual environments (VEs) are the extent to which the visual

[4] Rolland, Ariely, and Gibson (1995), referring to Augmented Reality (a reality where a virtual image is superimposed on a real image through a see-through head-mounted displays), consider Virtual Environments as an enhancement rather than a replacement of real environments. Sharma and Molineros (1997) distinguish between Augmented Reality (AR) and Virtual Reality (VR): the former would enhance the person's perception of the surrounding world, making the virtual world sensitive to the actual state of the surrounding real world during the user interaction with it; the latter would replace the perception of the real world with that of an artificial world.

features in virtual spaces are similar to the visual features in real spaces. A realistic reproduction of natural environments is considered as an aid to bridge the limits of the natural environments. In architectural design, Schmitt, Wenz, Kurmann, and van der Mark (1995) argue that a physical-based 'physical space' virtual reality (VR) that operates primarily through the simulation of physical aspects of real architectural objects can create convincing architectural VEs. This physical-based VR appeals to the fundamental elements of architectural perception, which includes tectonics, lighting, and materiality, because many limits of classical design models (Cartesian or geographic world models) are overcome. In the same way, Zobel (1995) argues that virtual space, in its similarity with natural environments, promises to bring the experiential qualities (texture, form, color, light, scale and movement) to the forefront, allowing participants to interactively manipulate and arbitrarily scale the environment.

- Studies of spatial orientation and perception in mediated environments, where the accuracy of the user's spatial perception and distance estimation of the virtual environment (VE) is at stake (Wartenberg & Wiborg, 2003). Again, Colle and Reid (1998) underline the importance of metric features in three-dimensional spaces for the acquisition of a metric spatial knowledge (survey knowledge) of a local, immediate virtual environment (space within the user's spatial span of attention). In order to understand the spatial exploration and navigation of the user, the authors propose a model that assumes the existence of two modes of spatial knowledge acquisition. The model depends both upon the metric features being explored and upon the action of the person in the virtual environment. Popp, Platzer, Eichner, and Schade (2004) underline the central role of distance knowledge (distance perception and estimation), during the navigation of environments in reality as well as in virtuality. The spatial knowledge is based both upon the Euclidean distance (the geometrical length between two points) and upon the route distance (the length between two points estimated both upon explicit knowledge, such as counts of steps, walking time, information from maps, and upon implicit knowledge, such as heuristics about time, speed, physiological effort).

When the mediated space is treated as a *place*, researchers focus mostly on the affective, social and cultural aspects of the experience in the mediated environments and the way in which its characteristics help to convey it.

- This is expressed in the design process, as is the case of Ciolfi and Bannon (2003; 2004). In research on the design of interactive physical environments, they adopt a geographical perspective on place, where the mediated 'place', focused on user's experiential quality and pragmatically-oriented, is a dynamic interconnection of structural, personal, social and cultural elements. In the field of virtual learning environments, Kalay, Yongwook, Wook, & Jaewook (2003) treat MS as a 'place' for learning. In the design of these environments, the authors propose to use, as a metaphor guiding the design, a place-making metaphor where a place is "the setting that transforms mere spaces and activities into unique socio-cultural events ..." (ibidem, p. 195). The place is the product of human action, and a shared sense of place orients people with respect to the space where they and other users are spatially, culturally and socially located. In the field of Computer Supported Cooperative Work (CSCW), Harrison and Dourish (1996) consider the MS as place constructed by user's action, reflecting cultural and social meanings ascribed by users. An interesting concept in their theory is "hybrid space": the interactions take place in a hybrid space that comprises both physical and virtual space and from which human space emerges.
- The attention to the human place is also present to guide studies of the users' experience: Gaintenby (1996), studying MUDs and MOOs, underlines that MS is "a product of not only physical objects (e.g., computer and fiber-optic cables) and forces (e.g.: electricity and information processing), but constitutive legalities and practices … It is through these practices and struggles that the notion of virtual space is made culturally, socially and politically meaningful." (ibidem, pp. 136-137). A further, recent example is provided by the construction of the "place probe," aimed at depicting the characteristics of the Place experience in natural and mediated environments (McCall, O'Neill, Carroll, Benyon, & Smyth, 2005).

Some studies seem to occupy a more middle position between focusing on physical and human characteristics of the mediated place: Bowman, Wineman, Hodges, and Allison (1999) emphasize the mixed nature of mediated space, as both a three-dimensional space, like natural space, and as a presentation of some forms of abstract or symbolic information, like scientific simulations and database visualizations. O'Neill and Benyon (2003), advancing a semiotic approach for investigating presence, consider the mediated space as an information place, constituted of semiotic forces (interpretations, meanings and significances that people ascribe living in a world of interactive systems), and not only of simple computational forms. The human interaction with technology results from the combinations of all those components: "We are increasingly living in a physical world augmented by virtual displays, and populated by interconnected information and communication devices" (ibidem, p. 87). Add to this a study about virtual learning environments (VLEs), which analyzed some features (such as representational fidelity[5] and presence) of an effective virtual environment for conceptual learning, and highlighted the importance of physical space as well as social space, in which users are immersed, for the enhancement of the sense of being in that environment (Whitelock, Romano, Jelfs, & Brna, 2000).

### 2.2 From Single To Multiple Inhabitants

Studies can be positioned along another continuum, distinguishing between systems with one or multiple users inhabiting the mediated space. The former are studies interested in the individual's perception, memory, spatial knowledge, emotion and/or on possible medical diseases and psychological disorders (traumatic experience, phobia, symptom distress, teen healthy).

Regarding the *study of individual users*, some instances have been already provided by the study on spatial orientation listed above, although this area of research does not necessarily deal with single users exclusively, as testified by the studies on the judgments of a shared visual space. For example, Kelly, Andrew, Beall, and Loomis (2004) focused their attention on the establishment of common ground (that is fundamental in planning complex coordinated actions) in virtual and real environments, in particular when the users (or collaborators) have visual access to the same space and perform collaborative tasks. The fields of medicine and clinical psychology provide

[5] The representational fidelity of a VLE is constituted by technical fidelity, representational familiarity, and representational reality. "Technical fidelity is the degree to which the technology idelivers realistic renderings, colours, textures, motion etc. Representational familiarity is the extent to which the environment that is simulated is familiar to the user. ... Representational reality is the extent to which the world is possible." (Whitelock et al., 2000, page 279).

other instances where the individual with his/her disorders and diseases has a central role in the creation of MS, because the patient 'projects' his/her distress, humour, anxiety, phobia, … in it. Hodges et al. (1999) considered the virtual environment as a space that assists post-traumatic stress disorder (PTSD) sufferers to imagine, visualize and describe their traumatic experiences. In the same way, Schneider and Workman (1999) treated the virtual environment as a space where the patients can be distracted from their disease. In this case, the MS mitigates chemotherapy-related symptom distress in children aged 10-17 years with cancer, through distraction. These advantages make the virtual environments a promising tool in clinical psychology for health care (Nemire, Beil, & Swan, 1999; VEPSY Updated Project: Riva et al., 2001).

The opposite extreme is occupied by the large body of studies *on multiple users* and privileges themes such as are interaction and communication, awareness and coordination. Maxfield, Fernando, and Dew (1998) argue that CSCW allows the sharing of product data and access and interaction with them through the creation of a virtual space constituted both by a shared data space and by local environments. In this sense, the CSCW bridges the limit of geographical separation in distributed working. Benford et al. (1995) maintain that, to promote cooperative work in virtual spaces, it is important to provide a direct visualization of shared data, allowing users to step inside databases and work together *within* data as opposed to merely *with* data. Therefore, virtual spaces, as abstract spaces, provide an arena for social action and interaction as well as natural spaces do. In the same way, Fraser, Benford, Hindmarsh, and Heath (1999) underline the key role of collaborative virtual environments (CVEs) in supporting awareness and interaction between users. Supporting awareness in interaction becomes an important factor in allowing tasks to be accomplished through CVEs; in fact, participants use features of the VE interface as resources to support their and other's awareness of action.

Also in this case, studies may be positioned in a middle way between the two poles: Boechler (2001), for example, underlining the key role of cognitive psychology in the identification and analysis of how the process of mind interacts with the web, argued that the World Wide Web (WWW) is a space with both a cognitive component and a social component. In his study of the Internet, Chan (2000), referring to home-page and to user's performance in the creation of his/her own home-page, maintained that in their home pages, users put their private life on stage during performances of self-presentation in anticipation of an audience.

### Intersecting the continua

Studies cannot but intersect the two continua. For example, in the studies of spatial orientation and perception in mediated environments, the MS may be treated as physical space. Wartenberg and Wiborg (2003) argued that an accurate space perception and distance estimation of VE can have a central role in the design of products, architecture, and workplaces; while Colle et al. (1998) sustained the similarity of MS (also in its metric features) with the natural space as an important element in navigation and orientation of a MS. On the other hand, clinical (psychology and medicine) research provides useful examples of studies matching "*human space*" with single inhabitants' perspectives. Hodges et al. (1999) considered the virtual environment as a space with affective (traumatic) connotations, which assists post-traumatic stress disorder (PTSD) sufferer to imagine, visualize and describe their traumatic experiences. The encounter between the *multiple Inhabitants* and the *physical space* is represented by those researchers studying the role of physical features supporting the users' interaction, as mentioned above in Kelly et al. (2004). Finally, a concern for multiple inhabitants in a human space is shared by those studies that analyze the affective and socio-cultural experiences with other users. For example, in the field of CSCW, Benford et al. (1995) consider mediated spaces as natural spaces because of their socio-cultural features (human space), which provide an arena for social action and interaction between users (multiple inhabitants). Also, Peris et al. (2002), analyzing online chat rooms, maintain that the Internet is a new social space (human space) for establishing communication between users (multiple inhabitants), whereas the chat channel is an interactive medium.

## 3. Spatial Presence

Initially coined as '*telepresence'* (Minsky, 1980), 'presence' refers to computer-generated systems that allow users to control, manage and manipulate objects located in a remote environment. Since then, the same term has been extended to include all situations where people experience the sensation of being present in a mediated site, either physically remote or computer-generated (Draper et al., 1998). Lombard and Ditton (1997) proposed a definition of presence as: "*the perceptual illusion of nonmediation*". While the use of the term" perceptual" emphasizes the role of human sensory, cognitive and affecting processes, the "illusion of nonmediation" underlines the extent to which the medium appears to the user as an invisible medium or as a

social entity. Furthermore, following the IPP model which describes the sense of presence as constituted by immersion, presence, and performance (Bystrom, Barfield, & Hendrix, 1999), Slater and Steed (2000) propose that the virtual environment is an overall gestalt formed from moment to moment through attentional resources, which are important determinants of presence process. Starting from this assumption, Slater (2002) argues that, in the presence selection mechanism, it is crucial to focus upon the essential features which allow us to maintain the perception of a virtual environment: "… even though we know "really" that there is not one there. The sixth sense is this process of seeing what we expect to see, and it doesn't take much for a virtual reality to convince us …" (ibidem, p. 438).

As it appeared from the research studies mentioned above, the topic of mediated space is becoming strictly tied to the topic of presence. In the field of virtual learning environments, Selverian and Hwang (2003) have suggested that learners can experience two types of presence in a VLE: "spatial presence, involving perceptions of sensorially "real" environments, and social presence, involving perceptions of social interactions with persons, places, or things" (ibidem, p. 516)[6]. Similarly, in the field of collaborative and networked environments, Biocca, Harms, and Burgoon (2003), reviewing existing theories and measures of social presence, suggest that presence is frequently treated as consisting of spatial presence or physical presence and social presence. The former is "the sense of "being in the virtual place," … ways in which our perceptions and actions create a sense of space" (ibidem, p. 456); the latter is "the sense of "being together with another," including primitive responses to social cues, simulations of "other minds", and automatically-generated models of the intentionality of the other …" (ibidem, p. 459).

Other empirical studies (Schubert, Friedmann, & Regenbrecht, 2001; Lessiter, Freeman, Keogh, & Davidoff, 2001) have underlined how the possibility to physically control, manipulate, and act on features of a displayed environment increases the sense of being physically located within it. There is a parallelism between these studies in the identification of presence-related components: Schubert et al. (2001) maintain that presence is constituted of 'spatial presence' (the sense of being and acting in the virtual space rather than in outside); 'involvement' (the extent to which the user focuses his/her attention only on the virtual space); and 'judgment of realness' (the extent to which the user considers the virtual space as similar to real space). In the same way,

[6] Selverian and Hwang, from their review of seventeen VLEs studies, found that high levels of spatial presence were associated with the achievement of lower-level learning objectives (memorization and repetition), while social presence was associated with higher-level learning objectives (analysis and synthesis). Finally, high levels of both spatial and social presence were consistent with the achievement of higher-level learning objectives.

Lessiter et al. (2001) identify three similar determinants of presence (sense of physical space, engagement, and ecological validity). These classifications have also some points of contact with the model proposed by Waterworth and Waterworth (2001), according to which three dimensions are key to the presence experience: 'locus', the extent to which the user experiences the sense of being in a real or in a virtual world; 'focus', the extent to which the nature of the user's attention are present stimuli or internally-accessed information; 'sensus', the level of attentional arousal of the user, from alertly awake to totally unconscious. Following this theorization, Riva and Waterworth (2003) and Riva et al. (2004) proposed a cognitive neuroscience approach of presence, in which it is described as a unitary feeling of being in a world existing outside the self. This experience results from the integration of three layers: 'proto presence,' as related to the level of perception-action coupling; 'core presence,' as the selective attention operated by the self on perceptions; and 'extended presence,' as the experience itself. In particular, proto-presence, based on proprioception and bodily orientation in the world, is the extent to which the organism differentiates itself from the external world. In virtual environments, the proto-presence is also known as 'spatial presence', strictly tied to the relation between the MS, the sensorial inputs and body movement.

The growing interest in spatial presence is also featured by the increasing interest in its measurement; indeed one of main objectives in the Measurements, Effects, Conditions (MEC) Project is the conceptualization and measurement of presence, in particular the development of a new spatial presence questionnaire based on a solid theory of spatial presence (Vorderer et al., 2004).

Another perspective concerns those studies that start from a belief that presence depends on a realistic re-production of natural space and/or of natural interactions. Witmer and Singer (1998) refer to the mediated space as the extent to which it mimics natural interaction and natural environment through involvement and immersion[6], allowing the user to experience the sense of being there. Following this theorization, Baños, Botella, Garcia-Palacios, Villa, Perpiña, and Alcañiz (2000) maintain that presence and reality judgment are important factors in virtual environments designed for the treatment of mental disorders (for example phobias): "the VR in mental health works in part because participants feel that the environment is real." (ibidem, p. 328). But reality judgment doesn't refer to the sensorial or pictorial realism, it refers to the

[6] "Involvement is a psychological state experienced as a consequence of focusing one's energy and attention on a coherent set of stimuli or meaningfully related activities and events. ... Immersion is a psychological state characterized by perceiving oneself to be enveloped by, included in, and interacting with an environment that provides a continuous stream of stimuli and experiences." (Witmer & Singer, 1998, p. 227).

willingness to consider virtual experiences as veridical. In a study of the perception of the distance from an object to a nearby surface (Hu et al., 2002), an accurate perception of the distance (physical space) is shown as an important component that increases the sense of presence in a VE, particularly where the user performs actions.

The great interest for the nexus between presence and the fidelity, similarity, or reality of user interaction and/or MS with natural interaction and/or natural space is evident in several studies (Bailenson, Swinth, Hoyt, Persky, Dimov, & Blascovich, 2005; Friedman, Slater, Steed, Leeb, Pfurtscheller, & Guger, 2004; Vinayagamoorthy, Brogni, Gillies, Slater, & Steed, 2004; Lok, Naik, Whitton, & Brooks, 2003; Mania & Chalmers, 2001; Kalawsky, 2000); however, "It is important to keep in mind … that intensity does not equal quality. We can be bored in VR and moved to tears by a book" (Ijsselsteijn, 2004, p. 48). Therefore, though a higher sensorial involvement is an important but not a sufficient condition to feel present in a technologically-mediated environment, other factors may contribute, just like social interaction (Ijsselsteijn et al., 2001).

From a different perspective, close to existential philosophy and ecological psychology, Zahorik and Jenison (1998) acknowledge the role of the surrounding space by defining presence as "*the extent to which a person successfully supports action in the environment*" (ibidem, p. 87). Underlying this definition is the dynamic interaction between user and environment, where experiencing the sensation of being there is strictly tied to the extent to which the environment supports the user's action and interpretation. "Things in the environment are not merely sets of discrete, atomistic features. They afford potentials for interaction with perceivers/actors— they are ''ready-to-hand.'' Additionally, the use of a virtual reality system to monitor these interactions is unobtrusive and therefore does not interfere with the perceiver/actor's ''throwness'' in the environment. Further, this method does not depend on the subjective thoughts or feelings of the perceiver/actor, nor does it depend on objective measures of task performance. How well a task is completed, or how it feels to do a task is irrelevant. How the task is done, in terms of the dynamics of the perceiver/environment interaction is all that matters." (ibidem, p. 88).

Extending the previous perspective with theories from human geography and ethnography, Spagnolli and Gamberini (2005) propose a model in which they emphasize the central role of place and action in the constitution of presence: with the presence concept, they refer to "*the property of the agent who manifests herself through the constitution of a place during action*: action catalyses some cultural, material, and cognitive resources and holds them together in a new whole, the Place;

the agents' connection with those resources becomes the origin and the evidence of her presence." (ibidem, p. 8).

Finally, the notion of Place has been dealt with thoroughly by the Benogo Project, which aims to investigate and develop "novel technology, that allows real-time visualization for a moving observer of recorded REAL PLACES, with ideas of researchers from diverse fields to develop new tools for empirical and theoretical studies of presence based on the concept of the observer's embodiment in the computationally created virtual environment."[5]. Above all, Turner and Turner (in press), reviewing the established place literature and arguing about the relation between place, sense of *place* and presence, have advanced the idea that place could be considered as a factor that influences the presence experience: "we propose that sense of place reasonably and usefully be considered as a further 'content factor'" (ibidem, p. 5) that influences the sense of presence.

## 4. Discussion

The study of virtual/mediated space has been characterized by some recurrent controversies, including: a realistic approach, countered by a socio-constructionist approach to the nature of the mediated space; an identification of the mediated space solely with the digital and electronic components, opposed by a hybrid conception of the mediated space; an emphasis on freedom and dematerialization, countered by one on the material and political constraints embodied in the mediated place. We'll briefly consider each of these points separately.

The first debate goes back to an opposition between positivistic and constructionist approaches to human reality. According to the rendition made by Mantovani and Riva (1999), an ontological, ingenuous realism considers reality as "a set of objects located outside the mind (the influence of Cartesian dualism between res extensa and res cogitans is obvious) and […] a set of well-defined characteristics. [...] The relationship between reality and virtual environments has been viewed as that between a state of "real" things ("real" by definition being extra-mental and "objective") and one of simulated things which, although not real (in the sense that what is perceived does not correspond to "external" objects physically present in the environment), is still in some way "real" (in the sense that it produces a convincing perception of the presence of extramental objects)." (ibidem, pp. 5-6). Scholars who consider the MS as a social construction that involves socio-cultural, affective, and cognitive features as well as

[5] Information available at http://www.benogo.dk/about/summary/index.html (on 11/March/2005).

physical features see the mediated space as constructed by the very act of usage, appreciated in terms of the users' categories and interests. From a cultural-psychological model, it is a powerful new artifact that requires the formation of appropriate cultural codes to be integrated smoothly with people's everyday experience (Mantovani, 2001), so there is no difference between real and virtual spaces, insofar as they are both places for meaningful social interaction mediated by artifacts. The technological simulation has the capacity to reproduce a context in which social actors may communicate and cooperate (Mantovani et al., 1999). Similarly, against an ingenuous realism considering the MS as the reproduction of real-world structures (such as rooms, corridors and buildings) and recognizable objects (such as tables and whiteboards), Benford et al. (1995) propose a *data* approach in which the mediated environment is an abstract space based upon a direct visualization of shared data, allowing users to work together. The virtual space is similar to the natural space, not because of the reproduction of physical features, but because it generates a social context.

Another controversy concerns the degree of *purity* of a mediated space. A perspective that could be defined as 'purist' defends a conception of MS as a space completely separated from natural space, regardless of the pictorial similarity between them. The *hybrid* perspective is adopted by those researchers who treat the MS as inter-related with natural space in specific ways; for example, Murray et al. (2000), examining how people navigate, explore, and experience a virtual environment (a facsimile of a city), suggest a continuous relationship between real and virtual spaces. Also in the field of CSCW, Harrison and Dourish (1996) maintain that the interactions in media spaces occur in a hybrid space that comprises both physical and virtual space. In the design of technologically-mediated learning, Kalay et al. (2003) propose a place-making metaphor, where a place is "the setting that transforms mere spaces and activities into unique socio-cultural events".

These opinions partly overlap with the concrete versus abstract ones; the abstract one has been very popular and tends to consider the virtual space as an illusion or as a free land where everything is possible, just because of its digital nature. Instances abound from the early definition of Cyberspace as a 'consensual hallucination experienced daily by billions of legitimate operators, in every nation… A graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding…" (Gibson, 1984, p. 51).

C. A. Childress (1999), suggesting a parallel between cyberspace and the Celtic "Otherworld," considers the Internet as an entirely new dimensional space: a domain outside normal time and space (without physicality and geographical localization). Childress sees the Internet representing a different domain of experience against the human experience with natural space and objects; therefore it needs new and adequate models for conceptualizing and managing the human experience and activity with it. D. S. Horner (2001), arguing about cyberspace and the fundamental error of conceiving people as essentially immaterial substances or potentially virtual inhabitants of mediated spaces, invites us to resist the seductions of fantastic conceptual possibilities, even if "The creation of new technologies of the virtual holds out the promise of deliverance from the limitations of existence in physical space. The ontology of this virtual space is an ontology without bodies." (ibidem, p. 71).

Lauria (1997), arguing about the nature of mediated space, such as immersive virtual environments that literally situate the user into an informed computational space, us located in an intermediate position. She argues that "virtual reality can be considered a metaphysical testbed, where the conceptual world, or the understanding of the knowing subject, merges with the experience of the virtual world, to yield a unit in knowing through a conflation of illusion and reality." This nexus between ideal and real, illusion and reality is *presence*.

In conclusion, these studies tend to treat space as an external variable to be processed by the user; a constructionist approach emphasizing the strict relationship between the configuration of space and the nature of the human presence is embraced by scholars of user interactions and by clinical applications of mediated spaces. This latter approach seems like a promising line of research as the interest shifts from virtual to mixed environments, where the experience of the virtual place is less the experience of a wired, artificial reality and becomes more intertwined with our ordinary experience.

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