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Agency and Presence: A Common Dependence on Subjectivity?

Abstract

This paper argues that presence, as shown in virtual environments, can usefully be seen as comprising various subtypes and that these in turn may have common conceptual and ontological features with a sense of agency as defined by Russell (1996, *Agency: Its Role in Mental Development*, Erlbaum.). Furthermore, an analysis of Russell's characterization of the concept of agency may be useful for acquiring insight into the sense of presence itself and the variables affecting it. Empirical evidence from cognitive developmental research and the positive results of attempts to develop symbolic understanding in people with autism spectrum disorders (ASD) in virtual environments suggest that presence may be more about experiencing agency than either pretending to be there or constructing and reconstructing mental models in real time. This analysis is used to shed some light on the current issues of presence research and to open up new philosophical and psychological aspects, in relation to both presence and ASD.

1   Introduction

1.1 Agency, Action Perception, Imitation, and ASD

From the point of view of the user of virtual reality (VR) systems, agency has been referred to by Murray (1997, p. 126) as "the satisfying power to take meaningful action and see the results of our decisions and choices." Consciousness of the individual/environment relationship and the potential for action afforded by the environment are very close concepts to both agency (Russell, 1996) and affordances (Gibson & Walker, 1984), which have been the focus of attention of other researchers in this field such as Spagnoli and Gamberini (2005) and Zahorik and Jenison (1998).

The field of cognitive developmental and ASD research (where it is argued there are specific developmental difficulties in acquiring a sense of agency; Jordan, 1999) leads to a definition of agency (Russell, 1996) that defines it as the exercise of a capacity for first person experience that has four integral features (Table 1). The first two features describe types of information-processing and control that the agent must achieve, and the other two describe the kind of self-knowledge that is available to agents and to agents alone. These features and their implications are given in Table 1.

In this paper, we explore the concept of presence as it is used in VR research

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Table 1. *Relationship Between Features of Natural and Technology-Mediated Agency*

Features of agency	*Implications in technology mediated realities for experiencing natural agency*
A. Locating the cause of altered inputs in one's body rather than in the world—action-monitoring.	• Being able to solve the problem of self-ascription versus world-ascription of the changes in the visual input, with accurate mocap or tracking systems (Gallistell, 1980). • Accurate and updated representation of the user body in VR directly (Tang, Biocca, & Lim, 2004), or in a virtual mirror (Gimeno, 2005) or in augmented reality settings.
B. The perceptual sequences brought about by acting are reversible; but those experienced in perceiving environmental change are irreversible.	• Being able to undo our stream of visual input just by going back again with our eyes over the previously seen stimuli. This is also applicable to other sensory channels.
C. Our actions are known nonobservationally whereas the world is known by observation.	• Being able to act in a first-person *perceptual* point of view within a VR environment including sensory factors (Witmer & Signer, 1998), multimodal presentation, and consistency of multimodal information (Held & Durlach, 1992).
D. Agents have a privileged knowledge of their own tryings, which they lack when observing the tryings of others (although the existence of mirror neurons—Rizzolatti and Arbib (1998)—provides a possible mechanism through which the linkage between one's own and others' actions might be made apparent).	• Being able to act in a first-person *conceptual* point of view. Russell (1996) explains that the agent's knowledge of what he/she is trying to do in a goal-directed action has a degree of first-person authority similar to that of an experiencer of a sensation (such as pain). For this to occur in the virtual environment there should not be any interference from others or from the computer when the participant is seeing the effects of his/her actions in that environment, but, rather, they should be seen as emanating directly from the actor/self.

and suggest that we may gain greater understanding of the processes involved in presence by comparing it to the development of what might be called natural presence in real (i.e., nonvirtual) environments. The sense of agency as delineated by Russell (1996) provides one aspect of that natural presence in real environments. The other aspect is concerned with perceptual apprecia-tion of the environment. Brewer (1986) used the term experiencing self to characterize our typical moment to moment awareness of ourselves in the process of percep-tion of the world. This is similar to, but perhaps more comprehensive than, the conceptualization of presence as proposed by Steuer (1992) who characterized pres-ence as the *sense of being in a place*. Presence, then, can

be considered to be a conceptualization for virtual environments of the conscious awareness of self, as both agent and experiencer, which characterizes the experiencing self of natural environments (i.e., using Brewer's conceptualization). We use presence in this way throughout this paper, to explore the usefulness of doing so for furthering understanding of the concept and how it might be enhanced technologically.

We further propose that this understanding of presence, which we will call tangible presence (i.e., experienced, rather than imagined), can occur in natural/physical realities (where a conscious sense of an experiencing self takes place), in technologically mediated realities (such as augmented/mixed reality or real (natural) environments equipped with ambient intelligence) and in virtual realities. Tangible presence is possible both remotely (as in telecommunications and teleoperations, that is, telepresence as referred to by Minsky, 1980 and Sheridan, 1992) and locally (as in augmented realities), and both alone or in social contexts (copresence).

1.2 Hypothesis about the Role of Agency in Presence

Analyzing how the sense of presence (or experiencing self) is acquired through typical development and in ASD offers some insights into the concept of presence and the role of agency in both the development and experiencing of a form of presence in any environment and by any individual. Several authors (Biocca & Delaney, 1995; Kalawsky, 1998; Sheridan 1992, 1996; Welch, Blackmon, Liu, Mellers, & Stark, 1996) have all seen presence as a multidimensional concept. We argue further that there is a multidimensional continuum that goes from absolute absence (not unconsciousness, but passive observance, with no agency to embody the experience in the environment) to the sense of being fully engaged in the perceived environment. Agency, then, is a regulating variable or, if preferred, one of the components that correlates with (and perhaps determines) the level and type of presence obtained. We also argue that presence is a subjective measure and, as a consequence, it adopts different forms for

each person at different moments or in different situations and with different technologies.

Finally, we propose that an agency based model is a better model than *constructivism* (proposed by Nunez, 2004) for describing and explaining the experience of participating in virtual and real environments, since it has greater potential to be an empirically (rather than metaphorically) based model.

2   Agency and the Development of a Sense of Presence

Agency and presence cannot be understood fully by paying attention solely to the environment or to the individual; it is necessary to consider the relationship between them. As individuals with ASD find it difficult to cope with the environment (perceptually, culturally, and socially) and, as suggested by Russell (1996), have particular identified problems with agency (possibly all those with ASD, although it is clearer in those with classical autism, defined by Kanner, 1943) and with an experiencing self (Powell & Jordan, 1993) we will also analyze this condition within this section.

To obtain more insight into that feeling of presence that we have in natural settings, it is useful to separate the sense of presence from the child's *development* of a sense of presence for which exercising agency is fundamental.

2.1 The Case of Typical Developing Children

There are different mechanisms through which the development of a sense of natural presence is supported; we outline here those that we find more relevant for the scope of this paper.

2.1.1 The Role of Sensory Perception in the Development of a Sense of Presence. The perceptions we receive from our senses have a very important role in the configuration of the sense of being there as they keep us connected with reality at every moment. Relevant here is the concept of *affordances* as noted by