"Real" presence: How different ontologies generate different criteria for presence, telepresence, and virtual presence

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Abstract. This article aims at showing that the meaning of ‘presence’ is closely linked to the concept we have of reality, in particular, to the ontology which we more or less explicitly adopt, and that different ontological positions generate different definitions of ‘presence’, ‘telepresence’ and ‘virtual presence’. This leads us to propose a ‘cultural’ concept of presence as a social construction, based on a view of reality typical of social constructionism. Lying at the base of this view are two elements which guarantee an elevated sense of presence: a cultural framework and the possibility of negotiation, both of actions and of their meaning. Within this view, experiencing presence and telepresence does not depend so much on the faithfulness of the reproduction of ‘physical’ aspects of ‘external reality’ – which is also a social production, and not a primitive or ‘natural’ fact – as on the capacity of simulation to produce a context in which social actors may communicate and cooperate.

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1. Introduction: Presence within reality

As indicated by the name of this journal, for those who deal with Virtual Reality (VR) and Teleoperation Systems (TS), a clear definition of ***presence*** and ***telepresence*** and univocal criteria for verification are both essential. Most research-workers in the fields of VR and TS share the current common meaning assigned to these concepts, which are defined by Schloerb (1995) as follows: ***physical presence*** designates "…the existence of an object in some particular region of space and time. For example, this text (in some form) is physically present in front of you now" (p. 68). According to this author, physical presence accompanies ***subjective presence***, consisting of the perception of being located in the same physical space in which a certain event occurs, a certain process takes place, or a certain person stands (Heeter, 1992; Sheridan, 1992; Steuer, 1992; Slater et al., 1994). Subjective presence is a necessary but not sufficient component of presence and, as such, is placed among the criteria of verification next to "objective" criteria. In particular, as Schloerb emphasizes several times, "at the heart of the theory is the idea that presence involves objective interaction" (p. 65).

The crucial point of the question is how the "objective" character of presence and the process of interaction are conceived. If presence means being "physically present" in a given space at a given moment, then physical telepresence is impossible, as Schloerb himself admits. It is a contradiction in terms: a person or object cannot "physically" be in a different place from the one in which they are "physically" at a certain moment. Schloerb attempts to escape the consequences of his definition with an ***ad hoc*** move. There is, he says, as an aspect of physical presence, ***causal interaction***, which does not necessarily require physical presence and which may also function at a distance. This aspect, which he calls ***objective presence***, is a more general type of presence that is suitable for the analysis of telepresence. The criterion of objective

presence is thus formulated: “an operator is objectively present if and only if it can successfully complete a specified task” (p. 68).

Our objections to this move are three. First: if we accept Schloerb’s proposed criterion of objective presence, with the aim of maintaining the possibility of teleoperation, we must reject his definition of presence as essentially physical. This contradiction between the objective character and subjective component of presence also occurs in the definition of Slater & Wilbur (1998), according to whom presence “...is both a subjective and objective description of a person’s state with respect to an environment” (p. 606). In particular, ***objective description*** is defined as “...an observable behavioral phenomenon, the extent to which individuals behave in a VE similar to the way they would behave in analogous circumstances in everyday reality” (p. 606).

Second, the true problem of this approach lies in what they presuppose. If we ask ourselves how someone or something can exert a causal influence at a distance, we must presume the existence of a world of artifacts, both physical and conceptual (Cole, 1996; Mantovani, 1996a) which mediate between actors and their environment. The same goes for “everyday reality”. Not all “everyday realities” are the same; they are mediated in a determinant way by the context in which they are inserted (Riva & Galimberti, 1997).

Speaking of mediation means speaking of culture, i.e., a network of instruments making up the everyday reality in which we live. In this view, it is impossible to continue to think that unmediated, pre-technological and pre-cultural “natural” objects exist. We cannot speak of action at a distance, teleoperation or presence in virtual environments without thinking of cultural mediation, of which technology is an important expression.

Our third objection is linked to the concept of ***objective interaction***. This concept implies a communication model as the passage of information from one person to another. This model, usually called the ***parcel-post model*** (Shannon & Weaver, 1949), is now in a state of crisis. The model of communication as information transfer does not take into account the cooperative component, which stimulates reciprocal responsibility for successful interaction and a series of subtle adaptations among interlocutors. As Dohény-Farina (1991) notes: "The theory of communication as information transfer

separates knowledge from communication; it treats knowledge as an object that exists independently of the participants in the innovation venture. With this independent existence, information becomes an object that can be carried through channels" (p.8). However, it is possible to communicate only to the extent that participants have some common ground for shared beliefs, recognize reciprocal expectations and accept rules for interaction which serve as necessary anchors in the development of conversation (Riva & Galimberti, 1997).

The present article aims at showing that the meaning of presence depends on the concept we have of reality (from the ontology which we more or less explicitly adopt) and that different ontological positions generate different definitions of presence, telepresence and virtual presence. We believe that the definition of presence based on physical presence is not only critically unfounded but also prejudicial for the development of VR and TS systems, which may serve as effective tools to promote cooperation and communication in everyday work environments. Alternatively, we propose a concept of presence as a social construction, following the perspective of social constructionism now strongly emerging in social psychology (Gergen, 1994). “Reality” is not “outside”, escaping social interchange and cultural mediation. On the contrary, it is continually being negotiated and filtered by artifacts, by means of which we adapt the environment to our needs and at the same time adapt ourselves to the environment in order to exploit the affordances it offers us.

There is no “natural” environment, passively received and registered by social actors. If we start from the principle that all reality is socially constructed, we have no difficulty in accepting the mediated character of experience which social actors have of environments, both “natural’” and “artificial’” (but this distinction, we repeat, is unfounded, as Shama (1995) shows). In our perspective, telepresence poses no problems: in TS, by means of a man-machine interface and a telerobot, the operator interacts with objects, which are modeled by technology. However, it is not true that the TS operator is able to “***sense and manipulate the real world***” (Durlach, 1997; italics in the original), owing to the simple fact that there is no “real” world as opposed to an artificial one. All worlds are, in various ways, constructed. VR poses a problem which is not very

different from that of TS: actors who move within VR are aware that they are interacting with a synthetic environment, the artificiality of which is perfectly clear to them before, during and after the experience (which may be immersive), and they are constantly reminded, during the VR experience, also by the poverty of sensory stimulation they receive. Here too, in VR, we are not dealing with an "artificial'" world as opposed to a "natural" one, but with various devices which mediate different types of interactions/interchanges between actors and environments.

In our perspective, the validity of telepresence (and of presence in a virtual environment) does not depend so much on the faithfulness of the reproduction of "physical" aspects of "external reality" (the latter is also a social production, not a primitive or "natural" datum) as on the capacity to produce a context in which social actors may communicate and cooperate (Mantovani, 1996b). The context, as Stone (1996) states, tracing a surprising parallel between the task of VR designers and that of phone sex workers – two figures who have the task of making the human body visible by means of extremely narrow channels of communication and who succeed in their task to the extent in which they use powerful, shared, cultural codes – is composed mainly of symbolic references which allow actors to orient and coordinate themselves.

2. Physical presence: *ingenuous realism*

The most widespread concept of reality – generally not explained but simply taken for granted – in the community of scientists, technicians and professionals who study virtual environments, is what we call ***ingenuous realism*** (Mantovani, 1995) and which Zahoric & Jenison (1998) prefer to call the ***rationalistic tradition***. In this view, reality is a set of objects located outside the mind (the influence of Cartesian dualism between ***res extensa*** and ***res cogitans*** is obvious) and has a set of well-defined characteristics. In the very act of knowing, the subject perceives the state of these pre-existing objects – in ways about which Western philosophical and psychological tradition has long discussed. Ingenuous realism contains an ontological position, which states what reality is (what is "real" and what is not, what being "real" means), and a gnosiological position, which states what human knowledge is (how and what we know, to what

degree of truth and certainty, etc.). The second level depends on the first since, according to ingenuous realism, human knowledge is limited to perceiving a pre-existing reality.

From the viewpoint of ingenuous realism, presence designates a state of things, a way of being an object, the fact that something or someone exists within a certain physical environment. Schloerb's (1995) definition of ***physical presence***, as we have seen above, is a variation of ingenuous realism. For those who accept ingenuous realism, TS is not an insoluble problem, since what is known – even through the mediation of artifacts – is still a piece of the "real world", however remote. But VR environments do constitute a problem because, from the viewpoint of ingenuous realism, on one hand they "really" do not exist, whereas on the other (in the misleading perception they give our senses) they do have a certain kind of existence – that of purely mental objects, "hallucinations".

Cyber-philosophy has answered the question as to what kind of reality VR is, usually following the perspective of ingenuous realism (Benedikt, 1991). 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 extra-mental objects). Most supporters of the cyber movement accept the principles of ingenuous realism and merely ask that VR objects be granted the same rights of citizenship in "reality" that ingenuous realism grants to "natural" objects. The status of VR environments is that of socially shared (or shareable) hallucination. VR is a space of ***consensual hallucination*** in which the human perceptual system is deceived into judging an illusory state of things as "real").

Ingenuous realism lies at the root of this vision, in which what is "external", extra-mental, is real, and what is (only) mental is for that reason denigrated as illusory, false. Several supporters of the cyber movement have been influenced by ingenuous realism, of which they accept the idea of reality as an extra-mental object from which the concept

of presence depends as a physical collocation in a physical environment, as participation in a collection of objects (Lanier & Biocca, 1992). For these researchers, presence consists of “the sensation of being in a certain environment” (i.e., the perception of being inside a collection of pre-existing extra-mental objects); telepresence is “the experience of being in an environment thanks to a means of communication” (p. 156). The former experience is “natural”, the latter “mediated” (Steuer, 1992). The only difference between the two is the absence (in the former case) or the presence (in the latter) of technological (cultural) mediation. In our perspective, we repeat, there are no areas of experience that are exempt from cultural mediation.

For most of the supporters of the cyber movement, as for those of ingenuous realism, the difference between presence and telepresence is that the former is a “natural” fact, whereas the latter is a fact produced by technology, an artifact. The adequacy of a telepresence system depends on the faithfulness with which is succeeds in recreating conditions which allow us to perceive ourselves, or other people or objects, as physically present in a “real” environment. The Media Richness Theory – which assesses the efficiency of computer-mediated communication according to its capacity to reproduce as faithfully as possible the conditions of face-to-face communication (the “natural” environment of conversation) is also rooted in ingenuous realism.

We do not believe that ingenuous realism offers an appropriate solution to the problem of presence and telepresence. It would be more suitable to avoid borrowing from ingenuous realism the idea that on one hand “real”, “natural” objects exist, placed outside social actors and, on the other hand, “virtual”, mediated objects, which are less “real” because they only exist in people’s heads. This dichotomy has no foundation in our view, according to which the whole environment in which human beings live is bio-culturally mediated.

3. Relational presence: the *ecological* approach

The supporters of various approaches, both philosophical and psychological currently contest ingenuous realism. One of the most interesting positions is that which

starts from Heidegger's philosophy and the theory of perception of J. Gibson (Zahoric & Jenison, 1998).

Gibson's criticism of ingenuous realism accuses Cartesian dualism, according to which there is a "real" world made of "object" on one hand, and one or more "subjects" on the other. There is no place for this type of dualism in a vision like that of Gibson, in which the relation between organisms and the environment is circular: "actions of the organism have consequences for the environment, and the nature of environment has consequences for the organism" (Zahoric & Jenison, 1998; p. 81).

Gibson's opposition to ingenuous realism is both ontological (external "reality" independent of the subject does not exist) and gnosiological (knowing does not mean contemplating "external" objects without touching them, but mainly means moving in the environment and using it – it is action): "Gibson's unique insight rests with the notion that the perceiving organism and the environment are intimately related - namely, that the environment has provided conditions commensurate with the organism's evolution. As a result, perception for the organism is the pickup of information that supports action, and ultimately evolution" (***ibidem, p.83***). Perceiving is an activity by means of which the organism identifies the resources it needs in the environment and attempts to capture them in order to achieve its own evolutionary aims – sustenance and improvement of its own genetic pool.

The environment does not provide undifferentiated information, ready-made objects equal for everyone. It offers different opportunities according to the actors and their needs. Affordances are not "things which are outside'" simply waiting for someone to come and take a photograph of them. They are resources, which are only revealed to those who seek them. If "a nipple is for sucking", then this affordance is taken up by a hungry calf which perceives the nipple precisely because it needs it, but this is not the case of an eagle circling high in the sky which does not need milk for its survival. The tree in the middle of a field on a summer's day is only an affordance to those who seek its cool shade. Objects, again according to Gibson, are perceived "directly", not through mental representations (we have some reserves regarding this last point, but they are marginal in this context).

This vision of reality, knowledge and perception gives rise to a criterion of veridicity of perception which is very different from that held by the supporters of ingenuous realism. In the latter case, perception is true to the extent that it faithfully reproduces the state of affairs existing in “external”, extra-mental reality, which is considered to pre-exist knowledge. In the former case, that of Gibson, valid perception is that which allows affordances which, however, may differ from one organism to another and from one person to another, reflecting the relation interacting between what exists as a potential resource in the environment and what an individual needs at a certain moment. Gibson’s (1979) criterion of validity is pragmatic and relational: valid perception (for every specific individual-environmental relation) is what makes possible successful action in the environment (within the context of that relation). We may question how this type of adaptive success may be measured, but we cannot deny that the criterion is clear, founded on a solid theoretical basis, and different from that of ingenuous realism.

What has all this to do with presence, telepresence and virtual environments? Zahoric & Jenison (1998) explain it clearly: “***presence is tantamount to successfully supported action in the environment”*** (italics in the original). This criterion sweeps away distinctions between near and far, presence and telepresence, “virtual” and “real”, which only make sense for the ontology and gnosiology of ingenuous realism. Ironically, Zahoric & Jenison’s definition of presence is not only valid for telepresence and virtual presence but, in particular, it adopts that very criterion of efficiency, of causal action, which Schloerb (1995) used to avoid the limitations of physical presence and to found on it the hybrid and contradictory concept of ***objective presence***.

Since the definition of reality implicit in Gibson’s concept is not dualistic but relational (affordances are not properties of either object or subject, but of their relation) and since the resulting definition of presence is not dualistic, the criteria used to verify presence are not dualistic either. There cannot be several “objective” versus “subjective” criteria of presence, as maintained by the TS and VR researchers who base their ideas on ingenuous realism. In Gibson’s perspective, “meaning is not a subjective interpretation ...meaning can be objectively specified and measured in terms of

constraints on action" (Flach & Holden, 1998). In this sense, action belongs to both actors and the environment.

This approach shifts the focus of our attention in planning and assessing simulation environments: faithfulness in reproducing the physical characteristics of the "real" environment is not necessarily the only thing to be borne in mind in simulation: the possibility of interaction which TS or VR environments allow is also important. More than the richness of available images (Sheridan, 1992, 1996), the sensation of presence depends on the level of interaction/interactivity which actors have in both "real" and simulated environments (Smets, 1995). Human action needs a certain amount of freedom of movement in order to adapt itself smoothly to the needs of a changing environment, which is why a good TS or VR system must grant a certain amount of freedom of movement to the actors who move in it. As noted by Ellis (1996) the key questions for a VR designer are: " Can [the users] accomplish the tasks they accept? Can they acquire the necessary information? Do they have the necessary control authority? Can they correctly sequence their subtasks?" (p.258). In fact, the successful implementation of virtual environment simulations will directly depend on the answers to these types of questions.

In this sense, emphasis shifts from quality of image to freedom of movement, from the graphic perfection of the system to the actions of actors in the environment: "Experience of space will depend more on the mode of locomotion than on the visual and acoustic images. The reality of a surface will be in its implications for action (e.g., does it impede locomotion) rather than in its appearance (e.g., does it look like a wall). In this approach, the reality of experience is defined relative to functionality, rather than to appearances" (Flach e Holden, 1998).

This may also explain how it is possible to speak of a sense of presence in text-based virtual environments, commonly called MUDs (Multi-user dungeon dimensions). Although these environments are poor from the sensory viewpoint, recent research on 207 MUD users showed that 69% of the subjects did feel a sense of presence (Towell & Towell, 1997).

4. Presence of social construction: the *cultural* perspective

The ecological approach supplies a valid line of research and development for TS and VR environments. As an alternative to the ubiquitous dualism, it proposes a relational concept of presence and telepresence. As an alternative to the cult of the image, it proposes centrality of action. We shall take up and expand this approach, integrating it with what Gibson had neglected/: the social and cultural dimension of experience. “Reality” is not produced by an encounter between specific environments and specific, structured human communities equipped with their own culture (which implies a particular system of artifacts, myths, rites, values, etiquette, cookery recipes, etc.).

In the same way, “action” in everyday situations is not just made up of movements, which a single individual accomplishes, but is part of social dynamics in which certain goals, both individual and collective, are aimed at, through the joint efforts of several actors. In order to be accomplished, many human activities – work, play, dancing, courting – require that knowledge relevant to the goal be distributed and that actions be coordinated among the various actors by means of cultural modes which pre-exist those interactions (between actors, and between them and the environment) and make them possible. In his brilliant study of cognitive-social ergonomy of the activities of the navigator team on a U.S. aircraft carrier, Hutchins (1995) gave an exemplary demonstration of the role which culture plays in organizing human activities: it is present not only in the hierarchical organization of the Navy, but also in the tools the navigators use, the regulations covering behavior to be observed in the various situations in which the ship may find itself, and the task definitions of each member of the team.

The ontology lying at the root of social constructionism is pluralistic, while ingenuous realism contains a good-sized dose of dogmatism: “for the constructionist there is no justification for fundamental enunciations of the real; whatever we take to be essential is an outcome of social inteechange. Theories cannot be falsified by virtue of their correspondence to something else called 'the real', but only within the conventions of particular enclaves of meaning” (Gergen, 1997). In place of the dualism proper to ingenuous realism – which made it difficult to account for telepresence, virtual presence

and more generally that plurality of worlds which cultural mediation makes available to us (with various degrees of involvement of technological resources) – social constructionism conceives the “real” as a co-construction, a process of reciprocal modeling between actor and environment (figure 1).

(FIGURE 1 ABOUT HERE)

Fig 1 – Three different ways of conceiving subject–object and the actor-environment relationship (Mantovani, in press).

In the first mode of figure 1 (unidirectional relation), subject and object are reciprocally separate and the problem of their correspondence is constantly posed (for ingenuous realism it is essential to be able to distinguish between “real” and constructed objects). In the third mode (co-construction), reality is defined as the intersection between actor and environment (social constructionism has no difficulty in accepting the fact that there are different realities, experiences, and types of presence which correspond to the various zones of co-construction of reality). The common actor-environment area arises from the encounter between the interests of actors (which are multiple, changing in time, often inconsistent, and not clearly ordered on a scale of priorities) and environmental affordances (which are also multiple, changing, and smoothly respondent to initiatives taken by actors). The result of this state of affairs is that everyday situations are inherently ambiguous (figure 2).

(FIGURE 2 ABOUT HERE)

Fig. 2 – The origin of the ambiguity of everyday situations lies in the characteristics of the encounter between the changing interests of the actor (A) and the equally changing affordances offered by the environment (E) (Mantovani, in press).

If an unavoidable feature of everyday situations is ambiguity, how can actors communicate and cooperate effectively? The answer comes from cultural psychology, which shows how the experience of the members of a given community is sustained by a framework which pre-exists individual interactions and makes them possible (Cole, 1996). Culture is the device which human societies use to reduce the ambiguity inherent in situations. This ambiguity does not disappear – it can never disappear completely, for reasons of principle – but it may be better managed by the social negotiation of the meaning of situations and accomplished acts. This is possible to the extent in which an (at least partially) shared frame of reference exists among the participants (figure 3), composed of culture as a device of mediation and made up of artifacts and principles.

(FIGURE 3 ABOUT HERE)

Fig. 3 – Culture (artifacts and principles) acts as a device clarifying the ambiguity of everyday situations.

Our proposed definition of presence develops that of the ecological approach but, unlike it: (a) recognizes the mediated character of every possible experience of presence; (b) always conceives experience as immersed in a social context; (c) emphasizes the component of ambiguity inherent in everyday situations; (d) highlights the function of clarification which culture (artifacts and principles) plays. Breaking down this concept into formulas, we may say that:

1. ***presence is always mediated by both physical and conceptual tools which belong to a given culture***: “physical” presence in an environment is no more “real” or more true than telepresence or immersion in a simulated virtual environment;
2. ***the criterion of the validity of presence does not consist of simply reproducing the conditions of physical presence but in constructing environments in which actors may function in an ecologically valid way***: we accept the emphasis of ecological approach on the primacy of action on mere perception;

3. ***action is not undertaken by isolated individuals but by members of a community who face ambiguous situations in a relatively coordinated way***: in order to be able to speak of an actor's presence in a given situation, his freedom of movement must be guaranteed, both in the physical environment (locomotion) and in the social environment, composed of other actors involved in the same situation, in whatever way and for whatever reason.

This means that an actor's presence in an environment exists if and only if that actor can cooperate with other actors and even enter into conflict with them. He must be able to decide to choose that particular mix of conflict and cooperation, which best suits his current goals. His freedom of movement in physical space, which the ecological approach claims as an essential criterion of presence, we extend to freedom of action in social space. Ultimately, there are only two elements, which guarantee presence: a cultural framework, and the possibility of negotiation, of both actions and their meaning. Stone's (1996) parallel between the tasks of VR designers and phone sex workers may give an idea of the sense we attribute to the cultural framework.

5. Conclusion

We have illustrated the links between various visions of reality – ingenuous realism, the ecological approach, and the cultural perspective – and the concepts of presence, telepresence and virtual presence on which current research is based. We believe that the idea of ingenuous realism mimicking external reality in TS and VR systems greatly hinders the potentials of these systems. We have presented the ecological approach as a true, liberating alternative to the dualism and dogmatism of ingenuous realism, promoting a more productive vision of presence from the viewpoint of possible simulations. Lastly, we have indicated in the cultural perspective, founded on a vision of reality of social constructionism, an alternative that on one hand follows in the footsteps of the ecological position and, on the other, leads it forwards until it embraces social reality and everyday life. Our criterion of presence as social negotiation of reality may be tested in research on cognitive-social ergonomy such as that of Benford et al. (1995). In the sense in which we understand it, presence may be measured to the extent

that, in a virtual (or “real”) workplace, given tasks are undertaken by social actors in conditions of ambiguity, distributed decision-making, and continual negotiation of goals.

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