An Action-Based Approach to Presence: Foundations and Methods

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ABSTRACT

This chapter presents an action-based approach to presence. It starts by briefly describing the theoretical and empirical foundations of this approach, formalized into three key notions of place/space, action and mediation. In the light of these notions, some common assumptions about presence are then questioned: assuming a neat distinction between virtual and real environments, taking for granted the contours of the mediated environment and considering presence as a purely personal state. Some possible research topics opened up by adopting action as a unit of analysis are illustrated. Finally, a case study on driving as a form of mediated presence is discussed, to provocatively illustrate the flexibility of this approach as a unified framework for presence in digital and physical environments.

1. Introduction

The need to reflect on the nature of presence appeared to us during a study with a virtual environment reproducing the library of our department. We started to notice participants dealing with occasional technical anomalies, such as the entanglement of a wire, or, less frequently, the freezing of the whole program (Spagnolli & Gamberini, 2002; Spagnolli, Gamberini, 2006). Problems like these (also found in Garau, Widenfeld, Antley, Friedman, Brogni, Slater, 2004) are believed to orient the participant's attention towards the technology (Dreyfus, 1991, p. 65; Winograd and Flores call this circumstance a breakdown, 1986, p. 36) and -since the epistemic failure to recognize the technology generating the virtual environment is considered as a precondition to the sense of presence (Floridi, 2005) - they are supposed to dramatically decrease the sense of presence. Nonetheless, participants kept wearing the helmet and handling the joystick, sometimes still in action in the virtual library or quickly able to resume such action as the technical problem was about to be solved. Thus, we started wondering where the participants' presence could possibly be located during those episodes. In the virtual environment or in the real one? Or suspended between worlds? And could "real reality" be neatly distinguished from "virtual reality" if to move in the virtual environment the participant had to operate on a joystick and rotate the head?

We felt the need to go deeper into the theoretical foundations of presence, as did several other colleagues, searching within disciplines that devoted special attention to the notion of human place, to the nature of action and to the role of technological mediation. The approach illustrated in these pages collects the input from various disciplines with a tradition of addressing those themes (e.g., Human Geography, Philosophy and Cultural Psychology) and results in an *action-based* framework according to which presence is dynamically achieved and maintained by acting in that environment. The merit of this approach in our view is to enrich the toolkit for the study of presence and to provide a unified approach to presence in virtual, real and mixed environments. Regarding the former, an action-based approach allows to investigate both the intensity of the sense of presence and the qualitative configuration of the presence experience. Regarding the latter, this approach can take advantage of current theoretical reflections on the study of human environments, acknowledging the commonalities between environments that only for historical reasons and disciplinary traditions appear as different. At the same time, the framework is able to identify the specificities of the presence in each different environment, tracking them back to the different affordances and the practice characterizing the tools mediating presence.

The chapter is organized in this way. Section 2 briefly describes the theoretical and empirical foundations of this approach, formalized into three key notions of place/space, action and mediation. Section 3 addresses some common assumptions in the study of presence with methodological implications. Section 4 illustrates possible research

topics that emerge when using action as a unit of analysis. Section 5 reports a case study on driving as a form of mediated presence, which provocatively illustrates the suitability for this approach to account for presence in mediated environments supported by any kind of medium.

2. Foundations

2.1 Space: The "there" in "being there"

By defining a person as present, one implies that person's connection with a certain place. This is partially acknowledged by the conventional characterization of presence as 'the sense of being there' (Lombard & Ditton, 1997; Biocca & Levy, 1995), where the deictic 'there' points directly to the environment within which presence can be both detected and defined — not only by third parties, but also by the present person herself. What is the nature of this relation with the environment?

Recently, this question has been dealt with under the rubric of spatial presence (as 'the consistent feeling of being in a specific spatial context, and intuitively knowing where one is with respect to the immediate surround' (Riecke, von der Heyde, 2002, p.1; also, Vorderer, Wirth, Gouveia, Biocca, Saari, Jäncke, et al., 2004) or mediated space (O'Neill, McCall, Smyth, & Benyon, 2005; Turner & Turner, 2004; Wimelius, 2004; Nova, 2005). Environmental psychologists have investigated the relationship between human behavior and the socio-physical space (Bonnes & Secchiaroli, 1992), sometimes in collaboration with architects and engineers (Canter & Lee, 1974). Paul Dourish (2001) in the field of Human-Computer Interaction mentions a sociological tradition of place studies and identifies some landmark contributions in this sense, mainly Anthony Gidden's concept of locale and Anselm Strauss's idea of social worlds. In contrast to a tradition that has separated the individual experience from the experience of specific objects, these approaches emphasizes the essentially relational nature of the individual experience of place.

The notion of Place (Casey, 1997) is used in Philosophy to capture the idea of a human environment reconfigured by the relation with its inhabitants and interdependent from them. Similarly, it is adopted in human geography to 'challenge empiricist and positivist approaches' to the study of human environments (Adams, Hoelscher & Till, 2001, p. xvi). In this domain, place was firstly articulated from a phenomenological perspective. Tuan, for instance, depicted the experience of place as a stance, determined by perception, memory and imagination and unfolding on an aesthetic, symbolic and sensorial dimension (Tuan, 1990). Subsequently, a phenomenological perspective seemed too much at risk of remaining trapped within the idiosyncrasies of the individual world, so action was identified instead as the source of the involvement with the environment (Harvey, 1973). In Bourdieu's words, the 'active presence in the world through which the world imposes its presence, with its urgencies, its things to be done or

said, things "made" to be said and said 'to be done', which directly command words and deeds without ever deploying themselves as a spectacle'(1977, p. 96). 'It is because we act, going to places and reaching for things to use, that we can understand farness and nearness, and on that basis develop a representation of world-space at all. It does not identify a point A in a neutral, container-like space, but rather, our spatial activities determine a "here" with respect to the things we deal with and the way we move. Regions are inherently organized by activities which emanate from a center of action.' (Arisaka, 1995, p. 4-6)

On these bases, presence is attributed to an actor who inhabits an environment by acting in it.

2.2 Action: Presence as a practical achievement

In the previous paragraph we have located the distinctiveness of presence in the relation between the human experience and the specific environment in which it takes place, and have considered action as the vehicle through which this relation is established. In fact, several theories posit action at the basis of cognition (Clancey, 1997, Lakoff & Johnson, 1999), consciousness (Hurley, 1998) and other psychological processes or states, including presence (from a phenomenological-ecologic perspective: Zahorik & Jenison, 1998; from a constructionist-cultural psychological perspective: Mantovani & Riva, 2001). It might be worth clarifying how action is conceived in this perspective. The practical engagement with the local environment has priority over any symbolic or representational process: there is never a cognitive plan to do something that is not already an embodied activity itself (Suchman, 1987). Action is not the mere physical execution of a plan or of a decision already made in the individual mind (as is maintained by other theories, e.g. Fishbein & Ajzen, 1975): it is the very locus in which plans are made and resources exploited. 'Our names for things and what they mean, our theories, and our conceptions *develop in our behavior* as we interact with and perceive what we and others have previously said and done' (Clancey, 1997, p. 3-4). These theoretical arguments can count on a great amount of empirical evidence; psychological research confirms that humans build their relationships with the environment by acting in it. A vivid piece of evidence is that far objects, including digital objects, can be re-coded by our brain as collocated within the peripersonal space if the user is able to act upon them with a tool (Gamberini, Seraglia, & Priftis, 2008; Gamberini, Carlesso, Seraglia & Craighero, 2013):.

This has several implications, but one of the most prominent is that, contrary to the Cartesian separation between mind and matter, the material and physical resources are put at the same level of more symbolic ones, since they are all crucial resources in shaping action. Presence is actively achieved and maintained by exploiting these resources, so reliance on material resources such as a joystick cannot *per se* be a possible impediment in the achievement of a genuine sense of presence (see below 'hybridity') (Spagnolli et al., 2003).

2.3 Mediation: Tools and their specificities

The status we confer to technologically-mediated presence with respect to presence in natural environments depends first of all on the role we attribute to technology in the human experience. The positions taken in the scientific community or in the media towards technology, as it is typical at the first appearance of an innovations (for instance, the reactions to the bicycle or the automobile, Kern, 1983, pp.141-158), have been very extreme — alternating fears and fantasies (for instance, Heim, 1999 or Hillis, 1999 for the former; Negroponte, 1995 or Turkle, 1996, for the latter). However, technologically mediated environments do not represent a discontinuity in the human landscape, but rather a further instance of a familiar phenomenon. Amin and Thrift (2002) mention several kinds of innovations: commuting, information transmission/storage, growth of reliable means to support everyday actions (such as gas or electric networks) and, growth of means of mass representation. All these innovations have represented 'a wave of re-mediation of everyday life, in which the very fabric of presence and absence, departure and return is reworked (…)' (Amin & Thrift, 2002, p. 98). Current technical innovations join previous innovations and extend the set of possible mediations available (Munt, 2001, Couldry & McCarthy, 2004).

Indeed, the use of tools has been a hallmark of human culture (Cole, 1996) and a condition for cognitive development long before digitalization (Vygotski, 1978). Most resources on which human cognition relies are located outside the human body, from material tools such as a calculator to abstract tools such as language or mathematics (Cole, 1996). Scholars pinpoint that it represents a way in which agents delegate part of their cognitive efforts to resources that are external to their individual mind and call this phenomenon 'mediation' (Hollan, Hutchins and Kirsh, 2000; Scaife & Rogers, 1996; Norman, 1988; Pea, 1993; Salomon, 1993; Lave, 1988; Lave & Wenger, 1991). According to the Vygotskian Activity Theory, mediation is the way through which human cognition becomes more and more complex (Nardi, 1996; Engestroem, Miettinen & Punamaki, 1999). Also scholars such as Murray and Sixsmith (1999), Harrè (1991) or Clark and Chalmers (1998) have questioned the idea that the individual is delimited by the confines of the body, interfaced to the surrounding yet separated from it. They emphasize the strong dependence of human faculties on external tools, prostheses allowing to move and to operate in the digital environment. These tools overcome the bodily limitations in manipulating, cleaning and constructing and inevitably influence the modes of being present. Furthermore, the actor-network theory has embraced the idea of a thorough and intimate human connection with technologies with its notion of the *hybrid* — namely, the union of an actor and a tool operating as a whole (Latour, 1993). A similar idea is the postmodern notion of the *cyborg*, in which tools are prostheses that become part of the person's functionality (Haraway, 1991), and which is well captured by the famous example of the blind man's cane (Dreyfus, 1991): 'We hand the blind man a cane and ask him to tell us what properties it has. After hefting and feeling it, he tells us that it is light, smooth, about three feet long, and so on; it is occurrent for him. But when the man starts to

manipulate the cane, he looses his awareness of the cane itself; he is aware only of the curb (or whatever object the cane touches); or, if all is going well, he is not even aware of that, but of his freedom to walk (p.75).'.

But then, if mediation is so widespread, what justifies the study of computer-mediated presence as a domain on its own? Presence in a computer-mediated environment is different from presence in other environments, and it is legitimate to study it as a distinct type of phenomenon. The reason is that any mediating tool shapes the contours of presence so if the tool changes, also the presence affordances are supposed to change. Studying presence in a computer-mediated environment means then studying the way in which the specificities of such environment affect that experience, either qualitatively or quantitatively.

3. Implications

The approach described in this chapter dissolves the bases of several presuppositions in the study of presence. We will consider in details three of them, the separation between digital and virtual presence, the objective definition of the mediated environment and presence as a personal phenomenon.

3.1. Beyond the separation between real and digital

The first image of telepresence that comes to mind is perhaps a virtual environment that offers the user a robust, credible world, alternative to the 'real' one. This representation assumes that being present means to approximate a state of exclusive and stable engagement with the virtual environment. This representation, although tempting in its simplicity, is imprecise for at least two reasons. First, it does not consider forms of mediated presence that are not immersive, for instance videoconferencing systems. Second, it does not include material resources that are necessary in order to produce whatever kind of digital experience we are designing, for instance the body. The arguments presented in the previous paragraphs make evident that presence is not exclusively made of resources found in the mediated environment; for instance, a person acting in a virtual environment is simultaneously operating the joystick, listening to the instructor, and enduring sickness or fatigue.

3.2 Beyond a neutral, objective treatment of the mediated environment

It is a common assumption in this field to consider that the digital tool that a person is using defines the environment in which his/her mediated presence is located. Studies usually offer a pre-defined definition of this environment, simply consisting of the name of the technical tool being used. Instead, the environment in which one is present is defined moment by moment by the actions undertaken, and is a collage of hybrid resources not matching the confines of the

digital space generated by the medium; the resulting the environment must be a matter of investigation, instead of being presupposed a priori. The episode of the digital library mentioned at the beginning of the chapter is pertinent in this respect. The users temporarily interrupted their action in the virtual environment, and started an instrumental course of action to resolve a physical problem with joystick and wire. During these moments, the active involvement with the physical environment became more relevant but part of their body was still oriented to the interrupted movement in the virtual space.

3.3 Beyond presence as an intimate state

Most studies of presence use self-reported data because they address the feeling of presence as a personal phenomenon (e.g., Spagnolli, Bracken & Orso, 2014); but if we are interested in acts of presence, the nature of our phenomenon is public. First, it is recognizable because it relies on common conventions and recurrent practices. Second, presence is consequential: the practices through which presence is established in a certain environment have implications to the actor and to other people. Third, presence is accessible to the subject performing the action, as well as to the researchers observing it. This opens up the way to new methods based on collecting actions, which are discussed in the next section.

4. Studying presence by collecting actions

There are several ways of using action as the unit of analysis for studying presence[1]. A first way is quantitative and tries to measure the intensity of presence by identifying categories of actions that reveal an engagement with the environment or with other users in the environment, and by measuring their occurrence. The current standard today is to collect these actions (or better, behaviors) automatically, by logging the user's operations on the interface (Hilbert & Redmiles, 2000), but is can also been done manually. For instance, in a study we carried out, participants were asked to navigate in the virtual environment; at a certain point, unexpectedly, an alarm rang and virtual flames invaded the virtual aisles (Gamberini, Cottone, Spagnolli, Varotto & Mantovani, 2003). Participants' movements in the virtual library were analyzed and showed a clear change in the interaction style after the fire: backwards movements started to be used, and collisions with the walls increased. This shows that the engagement with the virtual environment changes before and after the fire, and so the way of being present there. Another example is provided by a study on social presence, assessing how it changes if social feedback is provided to users (Martino, Baù, Spagnolli, Gamberini, 2009).

[1] This might remind the reader of the idea of using behavioral measures as indices of presence (e.g., Freeman, Avons, Meddis, Pearson, & Ijsselsteijn, 2000; Lepecq, Bringoux, Pergandi, Coyle and Mestre, 2009; Sheridan, 1992); but while those behavioral measures are considered as 'symptoms' of a phenomenon that is hidden to an observer, here action is considered as the exact the locus in which presence is achieved.

Social presence was operationalized as reciprocal behavioral engagement and then it was measured by studying the number and direction of communication exchanges between users.

A second approach is qualitative and aims at understanding the configuration of presence more than its intensity. It consists of observing the relation between an action performed in a certain way and the environment in which it takes place to identify the practices through which users construct their spatio-temporal presence in a certain environment or the way in which the environment itself is configured as an arena for action (e.g. Arminen, 2008; Licoppe, Ynada, 2008; Spagnolli, Gamberini, 2007; Spagnolli, Scarpetta, Tona, Bortolatto, 2008).

5. Driving as mediated presence

To offer a provoking demonstration of an action-based approach to presence, we will consider the case of driving/riding a vehicle. After all, the car and the motorbike are prosthetic tools (Dant, 2004): they are controlled by the human body and add capabilities to it. We will use some examples from a collection of video-recordings of 8 experienced drivers aged 20 to 58 driving in a city in North-East Italy (Belluno). We had 4 people driving their motorbike, and 4 people driving their car. The vehicles were equipped with a camera (figure 1) that recorded the scene in front of the driver, fixed steadily on the top of the passenger seat or of the motorbike tank. Cars also had an additional camera shooting the driver from the rear seats, held by a member of the research team. Participants were asked to drive along an easy and intuitive route following the main streets in their city; the route included intersections with and without traffic lights, roundabouts, pedestrian crossings and other elements requiring the coordination with other vehicles. The observations occurred preferably during heavy traffic hours.

Figure 1 A participant driving on the street. The inserted picture is produced by the camera shooting the driver, the main picture is produced by the camera positioned on the passenger seat.

Lets' first consider what it means to be present on the street in a car. Figure 2 shows two sets of pictures aligned on a timeline, taken from the camera attached to the motorbike front. In the first raw, the motorbike is approaching a traffic light. The street is not divided into different lanes yet, but starting from the second picture, the motorbike moves to the left side of the street, preparing to turn left after the intersection. The automobile preceding the motorbike is closer to the traffic light, but from neither the position on the street nor the direction lights is it apparent what direction the car will take until the forth picture. At that point, its position projects the trajectory along which the car is moving and the motorbike reduces the distance from the car (11/00 and 12/00) and surpasses it, in this way showing its confidence that the car will no longer threaten to occupy the left lane.

This example illustrates the relevance of the pragmatic dimension of presence out of a laboratory setting. The presence of a vehicle on the street and the way it is managed has first of all a strong pragmatic import for all other vehicles. The position and appearance of the car is a richer source of cues on the driver's plans and projected actions than the limited set of dedicated communication devices available to the driver (e.g., direction lights). The drivers' presence on the street is a then not just an objective state or a feeling, but something that takes shape by acting on the street with the car and that – deliberately or not - provide cues to the other drivers to manage their own presence.

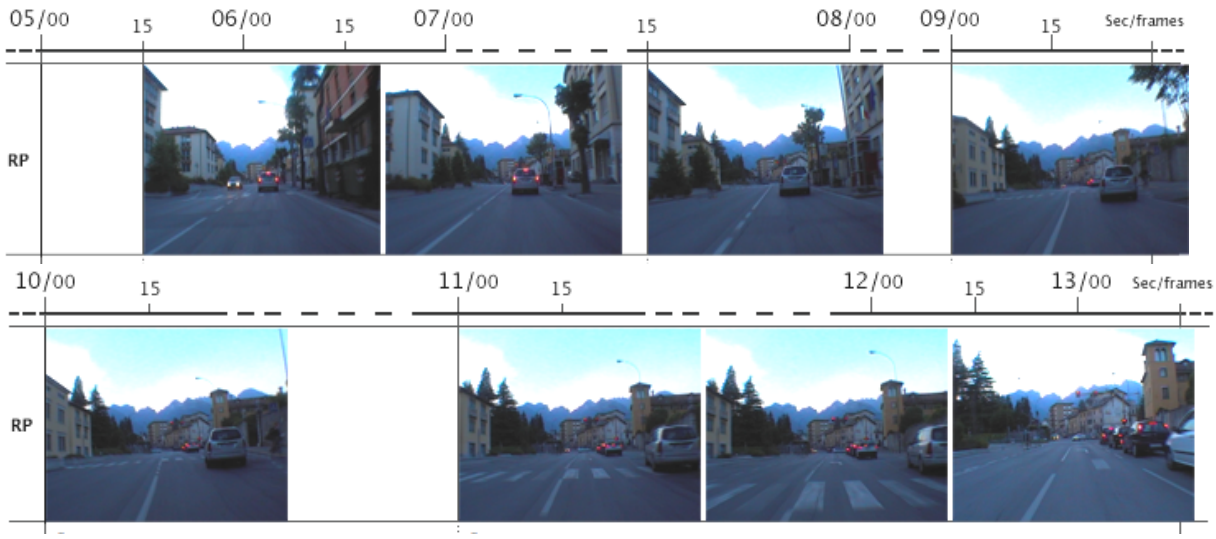

Figure 2 A motorbike driving on the street. The timeline above the pictures shows the time at which the events represents in the images occur, 30 frames per second.

In this context, it then becomes very important to analyze not just the feeling of the driver as part of a car-driver hybrid, but the specific affordances of the vehicle and how they allow to mediate presence and co-presence. We can notice for

instance that the difference between an automobile and a motorbike are dramatic; the former occupies more space, and lanes are drawn in such a way that automobiles proceed one after the other; on the contrary, motorbikes are slim, do not need to follow the previous vehicle and can easily occupy interstitial spaces that are not usable to the automobiles. The movement possibilities for a motorbike are richer and more versatile: space leftovers for the cars represent a precious escape route for the motorbike (Figure 3).

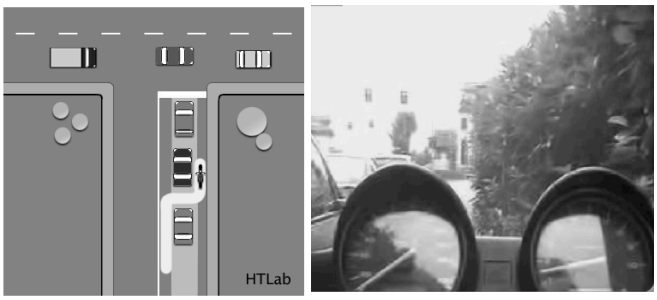

Figure 3. The interstitial room available to a motorbike seen from above (left) and from the riders' camera (right) .

In addition, motorbikes can accelerate faster than cars. As a result, the former are more agile and – at least in the Italian street in which they have been observed – they change position very rapidly, against a traffic background that is usually slower and more predictable. In our data, motorbikes remain in the car stream 77.24% of the time they spend in the traffic (defined as the time in which there are other vehicles in front of them). During the remaining time, amounting to 36 seconds per person on average, they manage to engage in 15 maneuvers in which they move between vehicle streams of different nature: parallel to the automobiles, between the automobiles or constituted of other motorbikes.
The mediated-presence of automobiles and motorbikes on the street space is then asymmetric, suggesting that studying the way in which co-presence is managed by drivers and riders and the specific practices and affordances used to do so would help to understand some potential coordination issues on the street. More generally, this example was meant to show that there is space to understand mediated presence even outside the virtual reality laboratory and that being present in a mediated environment – whatever mediates this presence - has pragmatic implications that an action-based model can help identify.

6. Conclusions

This chapter describes an action-based approach to presence, reminding that presence is enacted in addition of being felt. The interest is then not in the *sensation* of being present as such, but in the *acts* of being present and in the practices through which presence is achieved, manifested and recognized. Action becomes the unit of analysis and

allows us to address questions such as: what does it mean to be present in a certain environment? What is the configuration of the environment in which the user is present at a certain moment? What are the pragmatic implications of being present in that environment for the individual and the other co-present individuals?

This framework offers an additional option to presence scholars who have to deal with the complexity of this phenomenon. First, it is inclusive: it is applicable to presence in real and virtual environments alike. Second, this model describes the users' practices and does not abide to an objective depiction of the mediated environment, but it does not resort to subjectivism either. Presence is approached as an inter-subjective phenomenon, because it derives from cultural practices and is exposed to the ratification of the external events and social interaction.

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