Beyond Presence and Copresence: A Phenomenological Account of Experiences in Shared Virtual Environments

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Abstract

The study of shared virtual environments (SVEs) has centered on presence and copresence and this has yielded important insights. One limitation, however, has been that presence and copresence vary with the context of use, or with the activity carried out in the VE. If we analyze activities in SVEs in a phenomenological or micro- social interactionist way, we see that there are several – but only a few *key* - factors that shape presence and copresence regardless of setting and activity. We also find that the experience in SVEs can be analyzed in terms of the 'focus of attention' of the user, and this simplifies the analysis because a) the focus of attention is limited, and b) this focus has a limited range of things it is devoted *to* in VEs. By identifying the most common forces shaping experiences in SVEs and presence and copresence, it will be possible to put forward some hypotheses for further research and for how to design systems.

1. Introduction and Previous Studies

The experience of presence and copresence can be analyzed in a number of ways. One is to try to capture the psychological state of the user. There is a considerable amount of research on this topic, and subjective and objective measures have been developed (Scheumie et al. 2001). Psychological studies of this type have the advantage that they are repeatable and allow cumulative generalizations to be built up, although there is still debate about these measures. One limitation however is that these studies cover only very narrow ground – in terms of capturing very specific experiences under 'artificial' (non-naturalistic) conditions and for brief periods. These findings may therefore not apply outside of the lab and they will vary with different tasks.

A second approach is to catalogue the range of VR uses and settings and try to extract some systematic or general patterns from them. The aim in this case is an inventory of the different conditions of the experiences of presence and copresence (Schroeder 2002). The advantage here is that a wide range of settings and tasks can be covered, but a shortcoming of this approach is that by covering a range of experiences, it does not capture the fine grain of individual experiences. Further, this is a classification from an outsider or observer's perspective of the different systems and contexts, but what is the experience itself made up of within each context and from the user's perspective?

A third approach that will be attempted here is therefore to break the experience down into its component parts: what does the user's experience consist of? What is the 'texture' of the experience? And what types of presence and copresence attach to this experience? How does this vary – as under the second approach – from one setting to the next? What is the range of experience in the various contexts - but also, as under the first approach, what generalizable insights or cumulative knowledge can we derive that applies to this whole range?

2. Method

This essay adopts a phenomenological approach. By phenomenology is meant here not a particular epistemology, but rather an attempt to present phenomena in their 'raw' form, capturing the user's experiences as they appear to him or her. Another way to describe this approach is that it tries to capture empirical phenomena – what there is – on the surface, or the experience itself – without letting the observer's categories get in the way. This is of course a problematical notion, but this depends on what this approach yields.

A more narrow interpretation of the phenomenological (sometimes also called a social interactionist) perspective is that it adopts the user's point of view, it conveys the meaning that the experience has to the user. It is also said that this approach makes the internal meaning of the subject 'strange'. Yet another way to characterize phenomenology is that it concentrates on the micro- level of experience, on individual actions and encounters rather than the level of groups and longer-term relationships.

In what follows all of these elements will be combined (for a synthetic approach to micro-analysis, see Bull 2002). Where the essay will depart from phenomenology is that its practitioners often claim that it is not possible to generalize from particular contexts, or that all phenomena are contextual. Here, the attempt will be made to do the opposite, to identify features that apply to all VE experiences – or at least to the most common types. This is possible in this case because the most common experiences in SVEs, as we shall see, are quite restricted in scope.

To pursue such a phenomenological account, we can draw on the data from two sets of trial VE sessions (Steed et al., 2003, Nilsson et al. 2002) and on the author's own experience (the author was a participant observer in both sets of sessions, but the descriptions below are also based on interviews, video- and audio- recordings, and logs from the other participants). These two sessions, it will be claimed, are representative of a range of the most typical or common VE settings. One was a session with two users in a networked immersive projection technology (IPT) system, and the other a session with four users in a VE on networked desktop PC systems. The two sessions and the results from the sessions, especially about collaboration, have been described in detail elsewhere (see previous reference), but it will suffice here to say that both stretched out over several hours and involved a variety of activities: building together, exploring the landscape, solving spatial puzzles, and periods of communication without specific tasks. Differently put, both involved a mixture of object-oriented tasks and interpersonal engagement. These two sessions will serve as illustrations, although experiences from other sessions will be brought in occasionally. The claims about how representative these sessions are, to what extent they exhaust the range of experiences in VEs, and to what extent less common experiences differ or depart from these two, will be discussed in the full version of the paper.

3. The Components of the VE experience and the Focus of Attention

We can divide the experience into the following components: 1. place (where?) 2. task (doing what?) 3. interpersonal interaction and communication (how engaging with others?). This is perhaps the most general classification of the VE experience, but only the third applies specifically to *shared* VEs.

A good starting point for analyzing the experience of VEs – as for all micro-analysis of interaction - is the concept of 'focus of attention' (psychologists have a similar concept, 'attention allocation', see Vorderer et al. 2003). A key feature of the focus of attention is that the amount of things that can be focused on at any one time is limited. The focus of attention can therefore be seen as a stream whereby the focus shifts constantly - and from one of the three components to the other. And even though the focus of attention is limited, people are very adept at managing this limitation and shifting their focus to cope with the ongoing stream of inputs, in VEs like in real life (RL). Unlike in RL, however, the focus in the VE is a) very narrow in being focused on one of three above named components, b) constantly engaged since there is typically an ongoing reason for being in the VE.

3.1 Place

Whether one is surrounded by an immersive environment or engaged in a desktop environment, the focus of attention will continuously be engaged with the virtual place, either a) automatically – one is preoccupied with being in another place except for interruptions (a 'break in presence', see Slater and Steed 2000), or one has become so acclimatized to the VE so that one temporarily snaps out of it and remembers that is one is also in a real physical environment, or b) the focus is taken off the environment and focused on the task or the other person(s) which supercedes the focus on place *without* disturbing it c) there is a conflict with these other two foci such that the focus on place is interrupted.

The important point is that the stream of inputs about place – or the focus on space (place and space have been used interchangeably here since, for the purpose of this argument, the focus on spatial objects entails a sense of place) - either occurs automatically or it is deliberately maintained, so that – except for the breaks or interruptions just mentioned – this is a continuous focus in VEs. A corollary is that a lot of attention is devoted to 'repair' – not, as in RL, to maintaining the norms of what one expects from face-to-face interaction, but to maintaining the norm that things are like a real place and avoiding that one's task and interpersonal interaction should interrupt this norm.

3.2 Task

As with place, tasks – which we can limit here to spatial tasks since these are the most common ones (unless we regard communication as a task, but this is treated in the next section under interaction with others) – demand constant and self-conscious attention. Tasks absorb attention because they involve either manipulating objects or monitoring the environment. This includes an awareness of where the body is in the environment and an awareness of objects - which are both more self-conscious in VEs than in RL. Here the intuitiveness of the interface and our ability to cope well with a stream of inputs comes in: it is at once easy to do this in VEs, and at the same time requires continuous conscious effort.

The explicit or more conscious focus on a few things may explain why doing a spatial task – we can take the example of a Rubik's cube puzzle which was part of both SVE sessions – can be performed just as well in networked IPTs as in RL (Schroeder et al. 2001): heightened focus makes up for the need to cope with a novel environment, and therefore compensates for the greater demands on the user's awareness in comparison with RL.

3.3 Interpersonal Interaction and Communication

Whenever VEs are shared with others, maintaining an awareness of the others is an ongoing and attention-demanding effort. A steady 'holding the other in the visual and auditory field' is required and needs to be maintained. This is why, if the other is not in one's field of vision, it is necessary to monitor whether they are copresent by means of an audio signal from them. Since we do not have the same kind of audio signals or peripheral awareness of physical bodies that we have in RL, the signals of copresence need to be more explicit. We know this because in SVEs, silences need to be 'repaired' lest they should be interpreted as an absence of the other(s) or lead to confusion about where they are, or whether they are still there. This is particularly clear in an environment like Onlive Traveller (Becker and Mark 2002), where the express and often sole purpose is voice communication.

Awareness of the other person(s) is perhaps the most common problem in SVEs (Tromp, Steed and Wilson 2003). The shift to focusing to another person is much more conscious than in RL because in the VE it is necessary to single out another person that one wants to concentrate on and to keep them in focus – unlike in RL where we do this in a taken-for-granted manner with our physical bodies.

If interaction with the other involves more than communication – for example, in a common spatial task - there is also more self-conscious movement of the self in relation to the other than in RL. This is partly because one needs to position oneself in relation the other in order to be aware of them, partly because one does not want to cause embarrassment by walking through them or otherwise colliding awkwardly with them, and finally because one does not want to encroach on the other's space while at the same wanting to be in their field of awareness.

3.4. Changer over Time

So far, the focus of attention has been examined regardless of how it shifts over time. But in VEs, the focus also shifts as one becomes more familiar with the environment. There is likely to be a continuum of how one becomes acclimatized to VEs: short-term, the initial few minutes when one focuses on the new place upon first entering the VE, medium term, when one gets used to what one needs to concentrate on, and long-term – when one can ignore being in a different environment except for interruptions. However, this is speculative since we know little about the process of adaptation to the environment over time. Note however that adaptation, or change over time, does not mean that presence and copresence weaken. Rather, it is just that the focus on – or awareness of - these dimensions of experience weaken.

One important difference between virtual and real in directing and allocating attention is that in RL it can be taken for granted how to do this. In VEs, there is a more deliberate process of doing this, and hence also a deliberate focus on one input or another in a continuous stream. This deliberateness becomes 'less conscious' over time, and it is perhaps the key to adaptation to the VE.

3.5. Comparing Presence and Copresence in VEs and other Media

The concept of presence has been used for screen and interactive entertainment technologies that are similar to VR systems or VEs. One example is Klimmt's and Vorderer's (forthcoming) discussion of entertainment media such as computer games and suspenseful films. Ijsselsteijn (2003) also places VR into the history of presence media including all related forms of screen entertainment. The difference is that in these cases, even if there is a first-person perspective on the environment, the focus of attention is absorbed by the events onscreen, as a spectator. Similarly with roleplay or videogames – the attention is 'drawn into' or devoted to pre-specified events (goals, prompts for action) and these are responded to - rather than issuing from - the user.

Put differently, other media such as those described by Klimmt and Vorderer and Ijsselsteijn also demand a constant focus of attention, but the attention is determined by the narrative, and not self-initiated. This point will be contentious from the point of view that that the extent to which the user controls the interaction will depend on the definition of interaction. Note, however, that while there can be a high degree of presence with a low degree of interaction - and vice versa, VEs, by their very definition, always provide both. This point is amenable to testing, and a possible hypothesis is that: the more interaction issues from the user, the greater the self-reported degree of presence. But an easy way to make this point is to imagine asking about presence and copresence after no self-initiated action has taken place in the VE or without any interaction – asking about the two states in this case in a VR system would be meaningless! In this

way we come back to the flow of the focus of attention in SVEs, and to the need to maintain this flow in the light of the ongoing engagement with the environment.

4. Conclusion

The full version of the paper will go into further depth about the components of SVE experiences and how they can be analyzed in phenomenological or micro-interactionist terms. Such an analysis should not detract from the further study of presence and copresence as a psychological state, but the implication is that this should be complemented with a phenomenological account of the user's experiences.

Analyzing the components of the VE experience paves the way for a phenomenological-*structural* approach, whereby all the components are related to each other and the interrelationships (or structure) of the stream of inputs can be identified. And again, this is possible because the three components encompass the vast majority of activities or experiences in SVEs.

The implication of what has been said is that it may be useful not to think about realism or about presence and copresence, but about how we can give shape to the focus of attention. For example:
- Apart from the (dominant) visual environment plus the auditory signal from others who share the VE (because of the need maintain awareness of others), what kind of additional information, if any, will aid the user? Is additional information for most SVE applications distracting or superfluous?
- There will often be a trade-off between attention devoted to place, to task/activity, and to the other person(s): more of one will not necessarily mean less of the other, but it may be necessary to balance them, or to put them in sequence in order to avoid the user's disorientation or overload of information. Another possibility is that information lacking in one sensory modality may be presented in the form of another – for example, putting false but 'natural' visual or auditory cues in the place of haptic ones and thus creating an 'illusion' of touch without loss of presence (Biocca et al. 2002).
- Are there ways to overcome some of the problems that users face in VEs as opposed to RL? For example, could the 'silences' that disorient the user about the presence of others be overcome by means of visual signals? Or can awareness of others be enhanced by showing the user a 'mirror' of their own facial expression (Slater and Steed 2002)? Is it possible to improve the distinguishability of objects by 'unrealistic' means (vivid colors, highlighting of objects, semi-transparent objects to avoid occlusion)?

These and other suggestions might enhance presence and copresence, or make the environment more 'focus of attention' friendly, even when they are not 'realistic'. And it can noted that some of these improvements have been put forward for other reasons (such as usability), but some of these also may add complexity and therefore be distracting. The argument here differs in suggesting that these improvements should be made with due regard to the limits on the focus of attention. This means that the tools do not have to be realistic, but they must not detract from the other foci that the user is experiencing. This aspect is often ignored in the design of VEs.

In relation to presence and copresence, this account raises several questions deserving of further research:
- Under what conditions will a mismatch in focus of attention between the three components diminish presence and copresence? (and conversely, when is the user oblivious to such a mismatch?)
- Under what conditions will the disruption to the flow of the focus of attention by forces outside the VE will diminish presence or copresence?
- More generally, how can the flow of the focus on the three components be structured over the course of the experience so as to maximize and maintain presence and copresence?

One objection to the ideas put forward here is: VEs are intuitive interfaces, and many points made here about maximizing presence and copresence in view of the flow of the focus of attention, needing to get used to VEs, or needing to devote special attention to certain things unlike in RL – all these will disappear with more powerful systems and when we have become used to them. This objection overlooks a) that there are technological limits to these systems, b) there are limits to our sensory apparatus and to our focus of attention, c) the solution of more powerful and complex systems may be less suitable than designing tools that we can handle easily in terms of the phenomenological flow of our stream of inputs and activities.

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