

Five Theses on the Book Problem: Presence in Books, Film and VR

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Presence in virtual environments

Presence is usually defined as the subjective sense of being and acting in a virtual environment (Slater, Usoh, & Steed, 1994). It has been shown that presence depends on certain features of the virtual environment, for instance which interactions are possible, and which interaction techniques are used (Regenbrecht & Schubert, 2002). A common assumption in research on the sense of presence is that the better the *technical immersion* of the user in terms of sensory fidelity, real time, field of view and picture quality, the higher the experienced presence. In short, the experienced sense of presence is seen as a function of the quality of immersion. Comparisons of different VR systems have confirmed this hypothesis (e.g., Witmer & Singer, 1998).

However, from this perspective, it always seemed paradoxical that people can also experience presence in narratives presented in books, that is, with a seemingly very low immersion. For this paradox, Biocca (2002) has coined the term “the book problem.” We think that an analyses of the book problem can be very informative for a theory of presence, and in this theoretical paper we want to present what we think are lessons of the book problem.

Before we start, we have to make an assumption that helps us with this analysis: The sense of presence is not a direct function of immersion, but mediated by cognitive representations that are constructed on the basis of immersive stimuli, or, as Slater et al. (1994, p. 132) wrote: "perceptions generated by the [immersive virtual environment] are mediated through the mental models and representation systems that structure participants' subjective experience." In other words: Immersion is only the source of stimuli from which the users creates a mental model of the virtual environment and his relation to it. The structure of this mental model determines whether the user experiences a sense of presence or not.

Presence in film and text

Our analysis is based on the fact that the phenomenon of presence has also been researched in other domains, alas with different labels: In film theory, it is known as the *diegetic effect* (Burch, 1979; Tan,

1996), and in literature theory and research on the persuasiveness of narratives it is known as *transportation* (Gerrig, 1993; Green & Brock, 2000, in press).

In film, the *diegetic effect* is defined as the “experience of the fictional world as the environment” or that “the feature film creates the illusion of being present in the fictional world” (Tan, 1996, p. 52). Tan assumes that the diegetic effect is based on the general effect that paintings and photographs draw “the beholder in a position that is defined in relation to an imaginary space behind the window formed by the picture plane and the frame” (p. 53). The viewer of the film becomes an onlooker on an environment, “viewers experience the fictional events as if they were happening all around them” (Bordwell, Staiger, & Thompson, 1985, p. 37). The German director Michael Ballhaus (Nicodemus, 2001), famous for his 360° camera movements, said:

I want that after seeing a movie that was filmed in an apartment, the viewer is able to describe where the door is. That he knows how to get to the bathroom or to the kitchen. That he knows his way around and that he has a sense of belonging to the environment.

Films use their ability to create a diegetic effect in order to increase identification with certain characters (e.g., by showing the perspective of this character) or to induce certain emotions, among other ends. Of course, with a few exceptions movies keep the viewer in the position of an invisible observer - characters in the movie do not look into the camera (i.e., do not look at the observer), and the viewer has no body in the filmed environment. Although we do not know of any systematic research on what kinds of shots maximise the diegetic effect, from our own experience it seems that scenes shot with a hand camera that mimics the perspective and rhythm of a moving character and that obeys bodily constraints are a sure way to create a high diegetic effect.

Everybody knows that reading a gripping novel can transport us far away from the armchair to the environment described in the text, and that we can be totally absorbed in this experience. Building on this spatial metaphor, Green and Brock (2000, in press) have called this phenomenon *transportation*. In their definition of transportation in fictional texts, they emphasise the role of attention: “we conceived of transportation as a convergent process, where all of the person’s mental systems and capacities become focused on the events occurring in the narrative.” They assume that mental imagery evoked by a story has an impact on the attitudes of the reader when it is activated in the state of high transportation, because transportation inhibits a critical scrutinising of the content and the “message” of the imagery.

Transportation is measured with self-report items focusing on the construction of vivid imagery, awareness of real environment, and affective involvement in the story.

A comparison of the definitions and descriptions reveals both similarities and differences between forms of presence in the different media. All three conceptualisations use the metaphor of travelling to another place, and in all three media this phenomenon is at the heart of the experience. However, presence in VR seems most strongly related to a sense of actually being there, while transportation in literature seems most strongly related to an absorption of one's attention by the text. The experience in a feature film seems to be in the middle of these two poles.

Five theses

Building on the three different descriptions in three different media, we offer the following five theses for discussion:

- I. *The psychological phenomenon is the same in all three media.* Subjectively, for all three forms the metaphor of transportation is used. In all three media, the actual physical environment (VR laboratory, cinema, reading chair) is *suppressed* in favour of an alternative, medially presented and cognitively construed environment. The difference between the two is understood as a travel – transportation to another environment where one is then present. Furthermore, it can be measured in equivalent ways with self reports, although the scores may not be comparable. The items of Green and Brock (2000) and recent presence questionnaires (e.g., Schubert et al., 2001) are similar, although there is a different focus. To our knowledge, there is no self report scale specifically designed to measure the diegetic effect in film, but the quotes above speak for themselves.
- II. *To understand the book problem, we need to acknowledge the role of cognition as a mediator between immersion and presence.* The fact that presence can emerge both from the perception of visual stimuli and the understanding of symbols shows the necessity of *another layer* in a theoretical model of presence, namely that of mental representations. Although users report presence in a virtual environment or presence in a fictional narrative, this experience is *mediated* by mentally constructing an environment surrounding the body (Schubert, Friedmann & Regenbrecht, 2001). The content presented in the media is only the raw source of the mental model building, not a direct determinant of the presence experience. We think that this addition of cognitive representations as another theoretical layer is the key to the book problem – the paradox resolves when we acknowledge that not the presented stimuli make us present, but that we

ourselves build a model in which we feel present, and that this model can be built effectively on very different bases.

We can also reason which format this mediating layer of mental representation has. For the understanding of text, cognitive psychology of reading has developed theoretical models of how text is transformed into mental models. Glenberg (1997) has argued that these mental models are *modal* and represent possible *actions*. In other words, the mediating layer is not an amodal symbolic representation, but tied to actual sensory and motor representations (see also Barsalou, 1999, and thesis IV).

- III. *Presence in VR, film and text differs with regard to the amount of spatial presence and involvement.* An explication of the mediating cognitive processes can also explain the difference between the three media. We assume that two processes are involved: (1) constructing a spatial mental model in which own (bodily) interactions with the environment are coded, and (2) devoting attention to this construction. We can call these two processes spatial presence and involvement; they are also distinguishable in self report measures (Schubert et al., 2001; for a similar distinction, see Witmer & Singer, 1998). While VR is marked by a high potential for both involvement and spatial presence, literature seems strong on the involvement but weaker on the spatial presence side. Again, cinema seems to take the midpoint.
- IV. *Immersion should be understood as the offering of bodily interactions.* We hypothesize that immersion increases presence insofar it shows possibilities to bodily interact with the environment. We assume that coding bodily interactions is easiest in a virtual environment, where own actions (e.g., turning the head) directly lead to changes in the stimuli. In film, camera movements often imitate stages of perception or bodily movements, thereby offering possible interactions for the mental representation. In text, it depends both on the content and the cognitions of the reader; when both text and mode of reading focus on bodily interactions with the described environment, presence seems most likely (Lang, 1993). Mentally representing possible bodily interactions is *easiest* in VR, and *hardest* in reading. They can in many cases simply be read of the virtual environment (i.e., they are based on projectable properties, Glenberg, 1997), while an active and resource consuming mental model building is necessary in text understanding.
- V. *Books can produce presence because they use the power of narration.* Literature needs narration in order to produce a transportation, and film strongly profits from it, although it can do without (Burch, 1990). VR until now has largely ignored the use of narrative elements, with exceptions in

the 3D games genre. We think that narration adds meaning to a “mere space” by (a) introducing temporal sequences of causes and results or even (b) giving events in the space a social meaning. The paradoxical book problem partly resolves when we acknowledge that narration is an important part of the immersion.

A review of the results of presence in film and written narratives opens more comprehensive perspectives for research on and understanding of results of presence in VR. Research on film has focused on emotions, while research on transportation in literature has focused on persuasion and emotions. Both topics are important for VR, for instance with regard to treatment of phobias or with regard to effects of violent video games on aggressive behaviour.

In sum, the book problems forces us to understand which cognitive processes lead to presence. When we have understood these cognitive processes, both the unity of the phenomenon presence in different media and the difference between the media in the ratio between presence dimensions can be explained. Our main lesson, which we want to offer for discussion with this contribution, is that the cognitive processes *mental model construction* and *attention* can operate on very different bases, that therefore presence can develop from very different sources, and that it is therefore time to investigate these processes more closely themselves.

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