

# A USER-CENTRED MODEL OF PRESENCE.

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## ABSTRACT

This paper analyses different theoretical views of Presence, and proposes a new model highlighting the role that users should play in such a model. We expect to contribute to the discussion of what the model should be, and how it could be tested. We believe with this proposal the tasks of choosing variables and to interpret them could be made simpler. One relevant aspect of this proposal is the fact that it is independent from specific media, as it is centred on the user.

## RESUMO

Neste trabalho são analisados diferentes visões do conceito de Presença e é proposto um novo modelo que pretende ressaltar a importância que os usuários devem ter em tais modelos. O nosso objectivo é o de contribuir para a discussão sobre como se expressa um modelo de presença e a forma em que deve ser testado. Acreditamos que com esta proposta a tarefa de eleição das variáveis e a sua interpretação poderá vir a ser simplificada. Um aspecto relevante do modelo proposto é o facto de ser independente de um médio específico e centrado no usuário.

## INTRODUCTION

Even many researches are involved with Presence as a field of study the construct of presence is still new and unclear. Presence is defined as the sense of being there (Held and Durlach, 1992; Sheridan, 1992; Barfield and Weghorst, 1993; Steuer, 1993; Slater *et al.* 1994; McLellan, 1996; Witmer and Singer, 1998).

The concept of presence arises to conceptualise a user's subjective sensation of flowing into virtual environments. The great and fast development of new technologies allows to create virtual realities with educational, informational or leisure intentions. The key question is to know how technologies can be more and more successful producing this effect on individuals to develop new and effective forms of communication, social interaction and entertainment. This starting point could explain the actual technological approach to presence.

### 1. ABOUT A THEORETICAL MODEL OF PRESENCE

While most of the researchers in the field assume presence as a psychological phenomenon based essentially on cognitive processes they still use strong technological points of view in their studies.

A large amount of work has been carried out in the area of technological factors affecting presence. (...) Comparatively, the amount of studies trying to delineate the associated human factors determinant on presence is significantly less (Sas and O'Hare, 2003, p. 527).

The actual tendency is still the same and presence is still viewed as an effect or a result of several technological variables. However, human being is not a passive spectator using technologies. Whether reading a book or using a very sophisticated virtual reality immersive system, the human being is an active performer.

Nevertheless some circumstances have been keeping this technology-approach tendency. A technology-centred approach has some advantages: testing technological factors is easier and simpler than human variables. Creating experimental situations where media factors (as for example, the field of view) are manipulated is easier, and its effects on

136 presence are quite clear. But this technological approach has an important limitation, that is, it forgets completely the (active) user.

Even those models that allow an important place to user's variables do it in a restricted way. Most of them just refer to user's variables related with sensory channels including sensory coherence, distributed attention, and so on.

A subsequent disadvantage of this approach is that most models fail when applied to other media than the one originally tested. The poor generalisation of results to all media has dramatic consequences. On one hand, it seems to be one sense of presence for each media. On the other hand, actually we are able to show which particular effects are provoked under precise conditions using specific measures but we still don't know how presence occurs.

From our point of view, this failure also occurs because, based on this technological approach, authors propose models assuming specific technological assumption to provoke presence (sensory engagement, for example). Most of these technological assumptions are not valid with other media than virtual reality. Nevertheless, nobody doubts about the strong power of a good narrative to carry us away inside the most fabulous world. Could we assume this sensation as a strong sense of presence?

## 2. A SHORT LITERATURE REVIEW OF PRESENCE STUDIES: THE TECHNOLOGY-CENTRED APPROACH

As we comment above most of the studies reveal that the strong technological point of view is still the most common strategy. Most of the reviewed studies used a technology-centred approach where the main methodological design consist on the manipulation of some media variables for testing their effects on measures commonly related with presence as performance, physiological and behavioural measures and subjective measures, usually questionnaires and other constructs related as involvement and sickness. The most typically tested media variables are different media or VEs (Bailey and Witmer, 1994; Billingham and Weghorst, 1995; Bliss *et al.*, 1997; Bradner and Mark, 2001; Lombard *et al.*, 2000; Mania and Chalmers, 2000; Mania and Chalmers, 2001; Mania *et al.*, 2001; Schubert *et al.*, 2001; Usoh *et al.*, 2000; Waller *et al.*, 1998; Witmer *et al.*, 1996); different levels of immersion (Biocca *et al.*, 2002; Byrne, 1996; De Greef and Ijsselsteijn, 2000; Dinh *et al.*, 1999; Henry, 1992; Ho *et al.*, 1998; Jordan *et al.*, 2002; Lessiter *et al.*, 2001; Schubert *et al.*, 2001; Slater and Steed, 2000); field of view (Arthur, 2000; Dillon *et al.*, 2002; Duh *et al.*, 2002; Hendrix, 1994; Ijsselsteijn *et al.*, 1998; Kim and Biocca, 1997; Lin *et al.*, 2002; Prothero and Hoffman, 1995); viewing conditions (mostly stereoscopic vs. monoscopic presentations) (Arthur *et al.*, 1997; Freeman *et al.*, 1999; Ijsselsteijn *et al.* 2001; Ijsselsteijn *et al.*, 1998); motion (Detenber *et al.*, 1998; Freeman *et al.*, 2000; Ijsselsteijn *et al.*, 2001; Ravaja, 2002; Simons *et al.*, 1999); others (Kaushik *et al.*, 2002; Regenbrecht and Schubert, 2002; Romano and Brna, 2002).

Because of the large number of studies based on this approach we will comment the main results in a very summarised way.

Studies testing different media or VEs show that virtual reality is the best media enhancing presence but less successful than reality enhancing presence or improving performance and training results. Higher levels of immersion also provide higher rates of presence measured by questionnaires even the results are not completely well supported. The heterogeneity in terms of methodological designs presented in those studies don't allow us to establish strong conclusions about the influence of immersion and interaction on presence and other constructs related.

Field of view and monoscopic vs. stereoscopic view are two of the most studied factor related with presence. Results show some inconsistencies probably motivated again by the different measurements and methodological designs applied. Anyway and generally speaking it is possible to confirm that wider field of views and stereoscopic viewing provoke higher levels of presence.

A small group of researches also analyse the relation of different measures of presence between each other. All of them examined the relation between subjective and objective measures of presence (Bailey and Witmer, 1994; Mania and Chalmers, 2000; Meehan, 2000). Ones again results are not conclusive. While Bayley and Witmer (1994) found a weak and positive correlation between a subjective measurement of presence and task performance, Mania and Chalmers (2000) did not. Meehan (2000) found out positive correlations between subjective presence and some behavioural measures of presence but not with skin conductance. All these authors used questionnaires as a measure of subjective presence.

All these studies demonstrate the minimal attention given to the active user and his/her characteristics and desires as we pointed out in our model.

### 3. ABOUT A NEW MODEL BASED ON A USER-CENTRED APPROACH

We would like here to develop a user-centred approach. Our basic assumptions are, therefore, related with the role of user variables on a presence model:

**Presence is a state of consciousness.** According to Loomis (1992) and Slater *et al.* (1996), presence is the state of consciousness in which the self is perceived as being in a virtual environment. Lauria (2000, *cit. in* Sas and O'Hare, 2003) also defends that presence is a "shift of locus of consciousness" (Sas and O'Hare, 2003, p. 525). The model proposed here reflects this state of consciousness as "I am there".

**Individuals are active users.** As explained before, human beings are not passive actors of their own life. According to the ecological (bio-cultural) conception of presence defended by Mantovani and Riva (1999) following Gibson (1979) reality is not a set of stimuli and physical (human and non-human) objects but a culturally mediate context. In this sense the proposed model gives to the user's intentions the most important role on presence.

Presence as a **state of consciousness** of an **active individual** leads us to two other main assumptions, as pre-requisites of presence, which make up our model: meaning and absorption.

**Meaning: makes sense being there? And makes sense "there"?** Users are active actors in meaningful (real or virtual) worlds. Usually, meaning have been used in a very restricted way related with the salience of the perceived environments and the coherence or consistency of the sensorial information reducing this "meaning" to external characteristics of objects as scale, colour or texture but nothing about emotional, intellectual and biographical meanings of these objects and this (virtual) reality. From a broader point of view, in our model, individuals ask themselves if "there" makes sense in terms of contents, narration or physical characteristics but they also question themselves if it makes sense being there in terms of functionality, intentions and goals.

**Absorption: I am able to be there and I want to be there.** According to Wild *et al.* (1995) absorption has two different but related aspects called by the authors as motivational and skill aspects. In our own words, Absorption as a capability (I am able to be there) could be understood as suggestionability or susceptibility to feel inside a non-real

138 environment, to flow or to immerse in a different reality from the real one and to reach a different state of consciousness. Absorption as a volition (act of will) is the perfect way to represent our user-centred model: presence will occur if the user willingly permits the suspension of disbelief. We are talking about abilities and motivations.

Summarizing, presence will be sensed if (and only if) “there” is meaningful for the user and she/he is able and wants to be “there”<sup>2</sup>. The model is represented in the Figure 1:

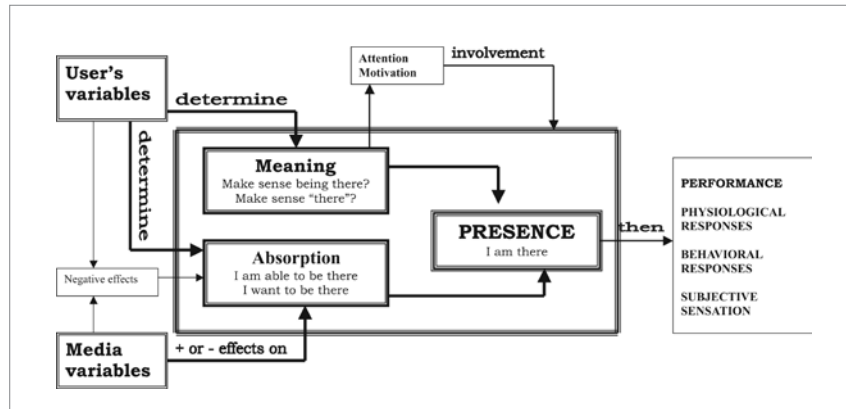


Figure 1. A user-centred model of Presence.

From this point on, many user and technological variables arise to determine, disrupt or enhance the sense of presence. Then, an immersive technology will enhance presence but only if the user wants to feel it, is capable of doing it and it makes sense.

Finally, according to some other authors we also presume that some user variables could be compensated by some media factors and vice-versa. In this sense, we hypothesized that a good capability of imagination could compensate a poor immersive media with low sensory engagement devices. In the same way, vivid and realistic media could balance a weak interest on the content. This compensation will explain why some people feel technologically sophisticated virtual realities as boring or uninteresting while others feel to be transported to unbelievable worlds just by (technologically) simple books.

#### 4. ACTUAL EMPIRICAL SUPPORT

The following researches show a clearer user-centred approach as our model defends. We will describe these studies grouping them into three groups. All three are illustrated in Figure 2.

The first group is represented by the works of Freeman and Avons (2000) and Rétaux (2002). Not surprisingly, in these studies the important role of the users only arises when subjects are enquired directly about their feelings and opinions. That reveals to us the significance and the requirement to extend our methods to those more qualitative ones. Freeman and Avons (2000) used a focus group methodology founding that, even equivocal, some “comments suggested that participants felt more present in scenes that they would have been interested in, regardless on the presentation mode” (Freeman and Avons, 2000, on-line). Participants also commented which kind of genres will be suit with 3DTV, enhancing high levels of presence (sports, theatre, concerts and action movies), and which ones won't (news, soaps, and documentaries). Their answers show that a better immersive device (3DTV) is not always better enhancing presence but depending on contents and on what users want.

Rétaux conducted in 2002 some interviews with some videogames players. Some of them declared “the degree of realism or immersion of the technology employed con-

tributes less and less to the user's sensation of being in the game after the first few uses. They said that it is the ability of the game to match their goals that allows them to feel like they are in the game" (Rétaux, 2002, p.163). In a different study, using the auto-confrontation method, participants cited as the most important causes of the increase of the sensation of being there those related with "having favourable situation of winning" (Rétaux, 2002, p.170) related with contents or activities but nothing about technological properties. Moreover, the causes for the decrease of presence more commonly remarked were those associated with "reduced danger, the onset of routing, death and annoyance" (Rétaux, 2002, p.170). We could understand all these circumstances as conditions that decrease the meaning or the significance of the game. We should remember that the game used in this study, called Quake, is a combat game.

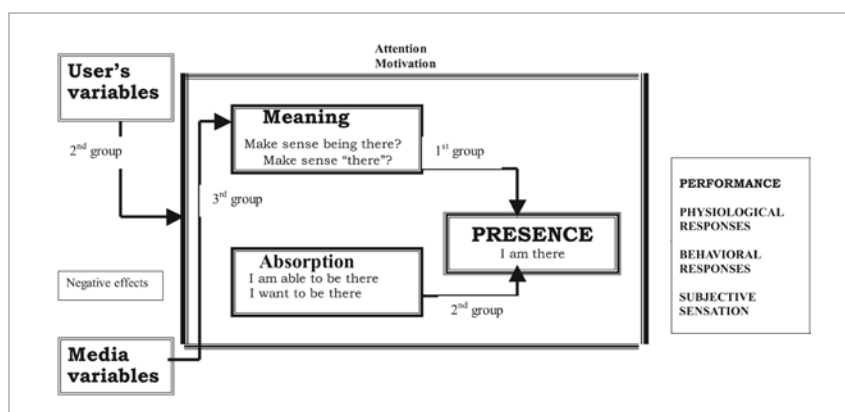


Figure 2. User-centred studies.

Label: 1st group: User's intentions and meanings; 2nd group: User's variables and absorption; 3rd group: Media variables and content.

The second group of studies arise from a quantitative point of view. Only four of the reviewed studies analyse some user's variables measuring their effects on presence as represented in Figure 2.

The first study was developed by Witmer and Singer in 1998. With the main objective of validate their questionnaire of presence, they analysed the influence of the spatial ability on presence. They didn't found any correlation between both constructs.

Freeman *et al.* (1999) tested prior training and compared two different group of subjects. One of them had prior training on the experience and the other one did not. They did not found any difference between these two groups on presence measured using a handheld continuous slider. Rétaux (2002) neither found any effect of prior experience on presence assessed by self-reports.

Finally, Sas and O'Hare (2003) conducted a study to link presence and some cognitive factors as empathy, absorption, creative imagination and cognitive styles. The regression analysis performed suggests that presence is a function of Creative Imagination, Absorption and a subscale of Empathy called Fantasy (Beta= .463; .270 and .232, respectively). Regression coefficient reached .66.

It is important to note the different measures of presence used by these authors.

The third group of researches also used a quantitative methodology to assess how some technological characteristics could determine how media content is evaluated. A representation of this approach could be seen on Figure 2. Dillon *et al.* (2002) focused their interest in testing how technological characteristics could influence on perceived

140 emotional contents. Their objective was to assess if high presence environments could induce subjects to perceive a neutral stimuli as important or meaningful. They used two different visual angles (21° and 42°) and three different emotional contents (neutral, amuse and sad). One of the most interesting results was that the presence scores (using a questionnaire) were different for each content showing that emotional content influence on presence independently of visual angle. Furthermore, the amusing content provoked higher levels of interest when showed on a 21°-screen than the sad content showed on a 42°- screen. Quoting Dillon *et al.* “intensity may also be determined by the degree to which an event is appraised as relevant to an individuals current concerns (i.e. motives and goals) (...)” (Dillon *et al.*, 2002, p. 225).

From this point of view, Bracken and Botta (2002) also conducted an investigation in which they assessed the influence of some technological variables and two different contents (action-adventure and drama) on presence. Their results will be welcome.

## 5. FINAL REMARKS

We analyse in this paper several studies about the factors that enhance the sense of presence. Most of them were developed based in a technological point of view from where media factors arise as central aspects related with the human sensation of being in another place different from the real one.

But faced in front of this technology there is a user holder of a cultural, psychological and biological heritage that generates a reality full of meaning. The construction of this reality is an active process in which the human beings place their needs, desires and intentions.

As we saw before, in the field of presence, only few studies explore the role of users when they are immersed in different worlds than real. The little interest showed by the researchers about the psychological factors related with presence should alert us to the importance of a greater advance on this area encouraging us to make a bigger effort focused on a better understanding of the human being.

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## [ FOOTNOTES ]

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<sup>2</sup> We use purposively "there" instead of "virtual environment" to emphasize the cross-media character of Presence.