

A subjective measure of presence feeling: the "autoconfrontation" method

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Summary

We present an original methodological approach in order to study the presence sensation during the activity and obtain a continuous assessment methodology. We use the "autoconfrontation method" that is previously used to obtain goals in the activity of the subject. This is an exploratory study with only 4 subjects.

1 Introduction

1.1 Approach

We are trying to understand the link between the user activity as well as the development of this activity and the sensation of presence. Our approach is based on activity theories (Vigotsky, 1934, 1985) and our methodology is based on interviews and observing real life activity.

Our work mainly concerns the virtual environments of the games. These environments call upon technology that is not very immersive: they do not properly envelope the perceptive system (Biocca and Levy, 1995). Nevertheless, the sensation of presence felt by the users is strong and is one of the aims of these environments.

This study is an exploratory study but does not provide a probative result concerning the role of experience in presence. Nevertheless, it has allowed us to develop an original methodology for continuously measuring presence and showing that presence varies in relation to the activity.

1.2 Presence

Presence is a concept that can be defined in different ways. In our opinion, authors talk about two types of presence: being in a location (by moving the body elsewhere) or being involved in what you are doing (by moving the interactions).

The first, presence in a location is the sensation of being in an environment. Here are the different definitions found in literature:

- ✓ Being present in a computer generated environment (Draper, Kaber et Usher, 1998).
- ✓ Being in a virtual environment (Gilkey & Wissenberger 1995).
- ✓ Being in a computational environment (Hoffman, Prothero, Wells & Groen, 1998).
- ✓ Being present in a particular environment (Huang et Alessi, 1999).
- ✓ Being in the computational environment (Loomis, 1992).
- ✓ Being transported into an environment (Regenbrecht, Schubert & Friedman, 1998).
- ✓ Being in the environment of which the technological basis is immersion (Shubber, 1998 using Slater and Usoh).
- ✓ Degree of sensation of being in one environment compared to another (Slater, Steed, McCarthy, Maringelli, 1998).
- ✓ To be in another place (Taylor, 1997).
- ✓ To be somewhere when one is physically somewhere else (Witmer and Singer, 1998).

Presence in the activity is the sensation of being involved in what you are doing. Here are different means of approaching this type of presence found in some literature.

- ✓ Presence in the situation of the task: broad awareness of ecological characteristics of the task (Fontaine, 1992).
- ✓ Loss of mediation : response to a mediated object as if it were not mediated: (Lombard et Ditton, 1997).
- ✓ Projection of capacities into an environment: via technical mediation (McGreevy, 1992)

We have conducted a series of interviews (Retaux, 2002) with players, in order to understand the nature of their sensation of being in a 3D game. No experienced user told us about a sensation of being elsewhere. They often insisted that they always know they are in front of their computer. On the other hand, they talked of being taken in, affected or immersed by what they were doing and they also said that they do not pay attention to anything that does not form part of the game activity. The interviews also show that the degree of realism or immersion of the technology employed contributes less and less to the user's sensation of being in the game after the first few uses. They say that it is the ability of the game to match their goals that allows them to feel like they are in the game.

The interviews show us that the users feel present in an activity and not so much in a location. The more experienced they are, the more this can be observed.

Other authors are already interested in the link between activity and presence: Hoffman, Prothero, Wells & Groen, (1998) believe that experience can affect presence because it can give sense to the activity. They show that players who play chess feel more present in a virtual environment representing a game of chess, if this part is probable and makes sense in reality (in other words, if the pieces are not placed randomly).

Jefs and Whiteclock (2001) base their ideas on the theory of activity when they assume that the past experience of the subjects will have an effect on presence, via perception or non-perception of the interface.

Finally McGreevy (1992) has studied the activity of geologists and showed that the activity coherence contributed to the feeling of presence of these professionals.

We tend to lean towards the activity of users of gaming environments, in order to observe whether their activity and the variations of activity in the time (learning) influence their sensation of presence. For this, we needed a continuous method of measuring the sensation of presence. We were unable to find this method in the literature. Only the physiological methods allowed the continuous measuring of presence. In any case, the interpretation of these measures by the experimenter is a delicate matter.

1.3 Autoconfrontation

This method developed by Mario Von Cranach and based on "action theory" (1979, 1982) targets the production of verbal data, based on the data previously collected during his own activity (films, statistics, spontaneous verbalisations...). This allows access to the cognitive procedures taking place during the activity: the individual explains his goals, strategies, limitations... The verbalizations during the activity are less complete and above all, they are likely to disturb the activity. When you use autoconfrontation directly after the activity, you get verbalizations that sometimes give more information about the activity than the subject gave before watching the video. The most simple and complete material for this method is the video recording of the person's activity.

This method allows us to describe and understand the activity of the players.

1.4 Subjective Evaluation

We were inspired by the work of I. Urdapiletta on sensorial evaluation. In order to obtain reliable and valid results concerning the taste evaluation of a product, I. Urdapiletta proposes to elaborate descriptors of taste and their definition in group.

To start with, we carried out interviews with users of virtual gaming environments in order to determine which terms best describe their sensation of presence. The expression "to be in the game" (or not) appears to be the most recurrent from one player to another.

We then created a group with the aim of defining the term "being inside the game" (in the meaning of "being in the game and taking part". In French, there's only one sentence - "être dans le jeu" - for this two meanings). If the interpretations of what creates the sensation of being in the game varies from one player to another, the term was immediately understood and interpreted as "being in the game and nothing else" for the majority of players. Being in the game means: performing, concentrating, being implicated, being touched and changing of scenery.

2 Method for measuring presence

2.1 Introduction

Our study leans towards a particular gaming environment called "Quake" developed by IDSoftware. This program offers around 20 gaming environments, even more can be downloaded from the Internet. Quake is a 3D combat game with a subjective view and space-adapted sound. It was conceived as a multi player game either on the Internet or LAN-game.

The first work on measuring presence was preceded by a long study (analysis of activity and interviews) on the use of gaming environments and Quake in particular. Players

modify the game and the computer in order to obtain optimum fluidity, precision and clarity. Furthermore, the knowledge of the 3D environment is essential.

We had to carry out this part of our research in a laboratory.

Nevertheless, we tried as best we could to reproduce real usage conditions. The players could modify the computer and the game as they wished and they all had an adapted technical system that was close to what they were used to. They brought their own mouse. We could not provide all the models of mouse and the players can be less precise just by changing mouse. The players were in a competitive situation, the usual situation when using this type of game. We could not play players against each other because that would introduce too many variations. Therefore, they were all playing against a computerised opponent (the same one) and we told them that their results against this opponent would be compared and the best would get a prize.

Our hypothesis was that their activity would vary according to the games and that the presence measure in each one of the three test games would increase if the 3D environment was not very well known by the player in the beginning. We also assumed that presence would not be uniform during a level.

2.2 Methodology

4 subjects participated in the exploratory study. They are male and aged between 18 and 28 years. They have different experience of using the game (all had already played it, but some more than others).

We tried to observe the role of experience in the use of this virtual environment. We also asked the subjects to come back 3 times. Each time, they played 6 games of 5 minutes before carrying out the test game.

The test game counted towards the competition (in order to motivate the player). It is also the one that will be analysed in terms of presence and activity. We therefore have three "test" games.

Overall development:

The first time began with a questionnaire on the experience of the subjects: their knowledge of the game Quake and also one of the 3D environments of the game called "Q3Tourney4" at the same time.

Player	Knowledge of Quake	Knowledge of Q3Tourney4
Player 1	High	High
Player 2	Average	Average
Player 3	Good	Poor
Player 4	Average	Poor

Table 1: experience of the players

The first time, the players modified the game and the computer. These parameters will be saved for the 2 following times.

Filmed activity

In order to understand how their activity varies, we filmed the integral games (back of the player, screen, keyboard and mouse) including the 5-minute "test" game.

Autoconfrontation of presence

The film of this game was shown to the player so he could estimate his sensation of "being in the game" on a scale of 0 to 8. This scale has enough degrees to measure fine variations of the sensation of presence, as well as a null value (0) and an average value (4).

If the player asked us to be more precise, we told them to estimate the variations in sensation whilst performing, concentrating, being implicated, being touched and changing of scenery. The players had difficulty in estimating their sensation of presence at the beginning of the game, but once the first estimations were completed, they responded easily when asked if they felt more or less in the game. The video tool allowed us to rewind and pause in order to specify the periods. In addition to estimating their feeling of presence, the players had to say why the degree of being in the play changed, and therefore the causes of presence.

At the end of this phase, we have 5 minutes of game divided into presence periods with a scale of 0 to 8 and with variations explained.

Autoconfrontation on the activity

This more classical autoconfrontation this time aims to divide the game in relation to what the player does. It is difficult to do this without the help of the player. There are numerous moments when you cannot say what is happening: for example, a movement to get equipment or a movement to position yourself are not distinguishable.

During this phase, we divided a game of 5 minutes into periods of activity. There are numerous activities and they vary from one player to another. Nevertheless, some are common to all players:

- movements to get equipment (armour and weapons)
- combat
- escape
- death
- looking for an opponent

We are particularly interested in the first two activities because they occur the most in the activity of all players.

3 The results

Firstly we note that the results of a subject's estimations of presence are not comparable to another. A presence of "6" for one player is not necessarily the same value for another because this value depends on their first evaluation. Then we choose to analyse mean differences.

3.1 Variation of presence in relation to experience

We have not registered any increase in presence related to the experience of the subject. The subjects who had the least knowledge of the 3D environment should have felt more present between the first and the third "test" game. This is not the case. The unanticipated unknowns of a game, whether it goes well or not, in fact have an enormous influence on the player's global sensation of presence. A more experienced player will not necessarily achieve what they want and will therefore feel less in the game. In order to properly observe a link between presence and experience, you have to increase the number of games in order to extend the effect of progression shown here.

3.2 Variation of presence in relation to activity

We have superimposed the periods of presence and activity. We see that combat activity creates more presence than that of equipment for all players individually.

	Player 1	Player 2	Player 3	Player 4
Equipment	-0.72248703	-0.40547561	-0.12791483	-0.17359143
Combat	0.7016275	0.58081498	0.32660608	0.65998653

Table 2: mean differences in the presence assessment related to activity

3.3 Causes of variations in presence

The causes of the increase in the sensation of presence that are most often cited by the players, are the increase in danger and good opportunities to advance (having a favourable situation for wining: equipment and geographical position). For the diminution of presence, it is reduced danger, the onset of routine, death and annoyance that play the biggest part.

Causes	More danger	Good chance of gaining	Less danger	Routine	Death	Bored (lack of fun)
Player 4	66%	0%	33%	55%	2%	0%
Player 3	71%	17%	17%	0%	28%	39%
Player 2	36%	24%	16%	6%	22%	16%
Player 1	78%	13%	23%	15%	32%	25%

Table 3: percentage of the two causes of increased presence and the 4 causes of decreased presence that are cited most often, respectively, causes of increase then decrease.

These results agree completely with the preceding results: the combat phases are much more dangerous than the equipment phases.

4 Conclusion

The method of continuously observing presence that we propose allows the simultaneous recording of variations in presence with a temporal precision equivalent to that of the video player and at the same time what has provoked this variation. We believe that the subjective evaluations of the players are not comparable, even if they speak about the same thing. Nevertheless, they allow us to understand and analyse the changes in the degree of presence. The major limitation of this method is the amount of

time it takes. The estimation of presence during 5 minutes of a game, takes on average 50 minutes in autoconfrontation.

Based on our interviews, we assume that first-time users of a gaming environment are more sensitive to the immersive characteristics of the virtual environments and the illusion of being in a new environment that this provokes. During the course of time, this illusion has less and less influence on the sensation of presence and is more and more influenced by the activity of the people and the evolution of this activity.

Presence and activity seem to be linked. The experienced players tested all estimated their presence as the most significant when they find themselves in a combat situation rather than in an equipment situation.

We did not observe any link between the players' experience and their sensation of presence in the environment of the game. This could possibly be due to motivational factors that would necessitate increasing the number of games and subjects to diminish their influence.

The follow up to our work will concern the further exploration of a link between the experience of users, their activity and presence. We will reproduce this experience with 15 subjects. Next, we will try to develop a new method of analysing presence in a faster manner whilst still allowing continuous analysis.

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