# Presence and emotion in computer game players during 1st person vs. 3rd person playing view: evidence from self-report, eye-tracking, and facial muscle activity data

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**Abstract**

*This paper describes a study on the effects of 1st versus 3rd person view in a computer game on presence and emotional responses. Two experiments were conducted and eye-tracking, facial muscle activity and self-reported presence was measured. The results supported our hypothesis on higher presence in 1st person view. However, this observation was not present in the eye-tracking data.*

## 1. Introduction

When perceiving information via media and technologies (e.g., computer games) users have a feeling of presence. In presence, the mediated information becomes the focused object of perception, while the immediate, external context, including the technological device, fades into the background [1-3]. It has been suggested that presence may serve as a moderator in that the effects engendered by the depicted environment/world (e.g., emotions) are stronger with higher presence. In the present study we were especially interested in the feeling of presence and emotional responses during playing a computer game.

The very essential precondition for a high presence state is the ability of a media (e.g., virtual environment or a computer game) to attract a person as if the person would be actually present in the mediated environment (i.e., the degree of "being there"). There are many things that promote presence such as the quality of graphics and sounds, among other things. One very common feature in games that may promote presence, but is yet very under-explored, is the mode of playing view. As compared to 3rd person view, 1st person view gives an impression of looking the playing scene with players own eyes. Thus the 1st person view may give an impression that the player is more inside the game than in the 3rd person view, which, in turn, may be more like watching some other person in the game. In the present study we wanted to examine whether the playing view (1st versus 3rd) exerts an effect on the feeling of presence. We hypothesized (Hypothesis 1) that 1st person playing view would prompt higher presence than 3rd person view.

Giver that presence may also serve as a moderator for other responses (e.g., emotions) to media stimuli (such as a game), we were also interested in the emotional responses to the game. It has been shown that EMG indexes positive (zygomatic major [ZM] muscle area), and negative (corrugator supercilii [CS] muscle area) emotional states. We expected that higher immersion would prompt higher ZM and lower CS muscle activity (Hypothesis 2).

One way to see presence refers to the degree of involvement and immersion into a stimulus [4]. When a person is highly immersed and concentrated into a stimulus, it is likely that he or she looses some sense of time and place, and makes less notice on the things happening outside the stimulus. In a highly immersive state people's attention is focused on the source of immersion and there is little attention outside the stimuli. Keeping this in mind, we wanted to study whether eye-movements could be used as an indicator of attention/game involvement, which we consider one important dimension of presence. We do not claim that eye-movements or facial EMG are indicators of physical presence, instead we propose that they are indicators of attention/game involvement, which, in turn, may be strongly related to presence (or one dimension of presence). We expected that there would be higher involvement in game in higher presence condition (1st person view) than in lower presence condition (3rd person view) which would also manifest itself in less eye-movement outside the game during playing (Hypothesis 3).

Two experiments were conducted to investigate the presence, involvement and emotions in 1st and 3rd person view and to evaluate the usefulness of self-report, eye-tracking and facial muscle activity data in presence research. The first experiment focused on eye-tracking and the second on facial muscle activity responses, while in both experiments we collected self-report presence. In sum, we expected that the 1st person view would generate more presence because the game is looked at like from the player's personal point of view, whereas in 3rd person view the game is externalized and looked from other persons view.

## 2. Methods

### 2.1. Subjects and materials

Participants were 50 Finnish male (31) and female (19) with various majors, who ranged in age from 16 to 39 years (*M* =26.6). They participated in return for two movie tickets. We used "Elder Scrolls 3: Morrowind" fantasy role playing game. It belonged to the most advanced and popular video games of the time in which the study was conducted and received a "game of the year award". In the two experiments we used the Morrowind game in 1st person and 3rd person view (see figure 1).

**Figure 1. Screenshots of the game area in 1st person (top panel) and 3rd person (bottom panel) view.**

The window mode of the game was used, because in the first experiment (eye-tracking) it was important to show distracting pictures in the PC screen in different places outside the game window (see figure 2). In order to effectively distract players' attention during game, we chose high-arousal negative pictures from the International Affective Picture System (IAPS, see [5]). Images were showed randomly outside the playing window at the corners of the screen (top-left, top-right, bottom-left, or bottom-right).

**Figure 2 Example of the view with distraction image (experiment 1).**

Subjects in both experiments first rehearsed the game for about 5 minutes and then played the game for two 5 minutes session. The rehearsal session and game session were in different scenes of the game, but same for every subject. Of the two experimental sessions, one session was in 1st person view and the other in 3rd person view. Half of the subjects played first in 1st person and then in 3rd person, whereas for the other half of the subjects the order was the reverse.

### 2.2. Measures and data-analysis

Subjects rated their feeling of presence after both playing sessions using self-report MEC-SPQ presence questionnaire [6].

Eye-movements were recorded continuously during the game in experiment 1 using Tobii eye-tracker. Psychophysiological electromyography (EMG) responses were recorded continuously during the game using PSYLAB recording devices in experiment 2. After the playing sessions the subject filled some background questionnaires.

Both experiments used a within-subjects design with playing-view as within-subjects factor. The sum of eye-fixations and gaze time outside the game area (1st experiment), self-report presence (both experiments), zygomatic major (ZM; an index of positive responses) and corrugator supercilii (CS; and index for negative responses) facial muscle activity (2nd experiment) were calculated for both playing sessions. All data were analyzed by the General Linear Model (GLM) Repeated Measures procedure in SPSS.

### 2.3. Results and discussion

The main results are summarized on the table 1. As shown in the table, there was higher sense of spatial presence self location and high cognitive involvement (subscales of MEC-SPQ presence questionnaire, see [5]) during playing in the 1st person view than during playing in the 3rd person view. The results gave support for our hypothesis 1, which stated that the 1st person view would generate more presence than the 3rd person view. We think that 1st person view may generate more presence because the game is looked at like from the player's personal point of view, whereas in 3rd person view the game is externalized and looked from as another persons view.

| | 1st Person | 3rd Person | df | F |
|---|---|---|---|---|
| VARIABLE SOURCE | | | | |
| Self-report: | | | | |
| MEC-SPQ: Attention | M = 3.89 SD = 0.72 | M = 3.79 SD = 0.72 | 1,49 | 3.81 |
| MEC-SPQ: SSM | M = 3.24 SD = 0.79 | M = 3.23 SD = 0.83 | 1,49 | 0.03 |
| MEC-SPQ: Spatial Presence Self Location | M = 3.0 SD = 0.88 | M = 2.57 SD = 0.83 | 1,49 | 14.26 *** |
| MEC-SPQ: Spatial Presence Possible Actions | M =3.08 SD = 0.76 | M = 2.93 SD = 0.76 | 1,49 | 3.65 |
| MEC-SPQ: HCI | M = 2.72 SD = 0.60 | M = 2.52 SD = 0.58 | 1,49 | 8.93 ** |
| Eye-tracking: | | | | |
| EYE-TRACKING: Number of fixations outside screen | M = 32.70 SD = 31.15 | M = 31.15 SD = 31.72 | 1,27 | 0.01 |
| EYE-TRACKING: Gaze time outside screen | M = 7525ms SD = 7467ms | M =7734ms SD = 8762ms | 1,27 | 0.02 |
| Psychophysiology: | | | | |
| PSYCHOPHY-SIOLOGY: ZM | M = 176,40µV SD = 20.95µV | M = 177.16 µV SD = 26.58 µV | 1,20 | 6.30 * |
| PSYCHOPHY-SIOLOGY: CS | M = 168.00µV SD = 21.06µV | M = 166.99µV SD = 25.03µV | 1,20 | 12.15 ** |

Note: * p < .05, ** p < .01, *** p < .001

As also shown in table 1, 3rd person view was felts as more pleasant (more ZM) and less unpleasant (less CS) than 1st person view. Thus the results were in contrast to our hypothesis 2, which stated that the more immersive condition (1st person view) would generate more pleasant responses. Even though high presence may usually be related to positive emotions, it may be that most players preferred 3rd person playing view in order to keep higher level of control to the game. Given also that the distraction stimuli were high-arousal negative pictures, it may be especially important to control the possible harmful stimuli. However, these notions must remain conjectural and the idea of level of control in game situations needs to be further explored in future studies.

In regard to eye-tracking data, we found no significant difference between 1st and 3rd person playing view. Thus, there was no support to our hypothesis 3, which stated that there would be less eye-movement outside the game area during playing in the more immersive 1st person view than during playing the less immersive 3rd playing view. The reasons for this result are not clear at present. Given that there were large individual differences in eye-tracking results and given that the manipulation of the gaming view (1st person vs. 3rd person) was small, the experimental manipulation may have failed to generate significant difference in eye-movement related attention.

## Conclusions

In summary, the present investigation showed that playing view exerted an influence on presence and emotional responses. As we expected 1st person playing view seem to generate higher presence than 3rd person view. However, the relationship between these higher and lower "presence conditions" and attention (eye-movements) and emotions (facial EMG) is not clear-cut. There may be many moderating factors, such as the level of player control, which should be examined in follow-up studies. Nevertheless, the results are of importance, given that games are one of the most commonly used media but yet under explored in connection with presence. The knowledge on games and presence can be used, for example to adapt the games to facilitate psychological effects such as engagement and emotion, and thus possibly increase enjoyment and learning, for example

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