Rules of engagement : influence of co-player presence on player involvement in digital games

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Rules of Engagement:

Influence of Co-Player Presence on Player Involvement in Digital Games

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Abstract

This paper presents an empirical study of social setting as a determinant of player involvement in competitive play. We conceptualize player experience as roughly comprising of components of involvement and enjoyment. Involvement relates to the attentional pull of games encompassing feelings of immersion, engagement and flow. Enjoyment taps into the fun and frustration of playing. A few recent studies indicate that co-players boost player enjoyment, yet the effect on involvement is still largely unknown. In line with enjoyment, involvement could increase with the sociality of settings. On the other hand, the presence of others provides a potential distracter and threat to involvement in games. Results of an experiment where social setting was manipulated within groups indicated that players' involvement remains constant or even increases with mediated or co-located co-players compared to solitary play. Hence, co-players do not break the spell of a game, but become part of the magic circle.

Rules of Engagement: Influence of Co-Player Presence on Player Involvement in Digital Games

Ever since its quick and successful reintroduction after the game industry's crash in 1983, digital gaming has become very popular across North America, Europe, Australia and Asia (Tan & Jansz, 2008). Simultaneously, digital gaming has also become a more and more social activity. The shift from solo-play to multi-play introduced the social component of playing together - either in competition or in collaboration - with co-players. The widespread penetration of the Internet now allows for social play without the restriction of co-players having to be in the same room. As a result, digital games are increasingly played together with other people, who indisputably become part of the player experience (Nielsen, 2005). However, this fact has not been considered in most of the player experience literature (Goldstein, 2007; de Kort & IJsselstein, 2008).

There are numerous reasons why the experience of playing with others differs from playing alone, many of which have their roots in the fundamental human need for affiliation, our need to belong (Baumeister & Leary, 1995). Playing together implies interaction with another person, and perhaps even a relationship, be it weak or strong, temporary or long lasting. This alone makes the event meaningful – perhaps explaining the ‘mere presence’ effect described by Zajonc (1980), that physiological arousal levels increase in the presence of another human being, even when there is no visual or other type of interaction. In addition, the presence of others may induce social facilitation, evaluation apprehension, and increased self-awareness, which impact on performance and affect (e.g., Cottrell, 1972; Carver & Scheier, 1981). Sharing experiences with others and recognizing similarities in terms of interest or affect is even more relevant socially and induces affinity and interpersonal attraction (Moreland & Zajonc, 1982) and

engenders a strong feeling of belonging (Raghunathan & Corfman, 2006). Moreover, affective states are affected by observable affective states of others through mechanisms of empathy and emotional contagion (Hatfield, Cacioppo, & Rapson, 1992), which may induce even stronger feelings of affiliation (e.g., Chartrand & Bargh, 1999). With the presence of others comes also the potential for pride or shame over performance, and impression management mechanisms to save face in the case of potentially negative perceptions of one's personality or capacities. Although this is clearly not a comprehensive overview of psychological processes that explain why social settings influence experience, it does illustrate that game experience cannot be restricted to the interaction between the game and the player alone.

Incorporating all these social processes and the way they impact on experience into player experience models is no mean feat, yet this does not free us from the need to consider the importance of social context in digital play. This impact is likely to vary with varying play settings such as solo-play, online play and multi-play, with interpersonal familiarity, and with players' awareness of and potential to communicate with the other player(s). Recently, de Kort and IJsselstein (2008) introduced a framework considering how social processes become significant when games are played together, and how these impact on game experience. Based on theoretical considerations, they argue that the degree to which other people play a significant role in player experience is shaped by characteristics of the social, physical and media setting. These characteristics shape the affordances for players to communicate and to monitor each other, and create a setting for co-player reinforcement. For instance room layout, furniture, and screen arrangements determine viewing lines between players in co-located settings, whereas the availability of additional communication channels such as chat functionality or an audio connection determine possibilities for meta-communication during game play. De Kort and

IJsselsteijn furthermore argue that the influence of these affordances on player experience is mediated by the player's awareness of and involvement with their co-player, and therefore approach player experience with social presence theory.

In line with this view we prefer the term *player experience* to *game experience*. It indicates the experience not only as a result of playing the game, but also as a result of playing it with others and in a particular context. Player experience is a broad term which can be roughly subdivided into player enjoyment and player involvement, where enjoyment relates to the amount of pleasure or displeasure a player experiences, and involvement is defined as the attentional pull of the game encompassing feelings of immersion, engagement and flow.

Recently, Gajadhar, de Kort & IJsselsteijn (2008a) empirically demonstrated the effects of social context on player enjoyment, and its mediation via social presence. In line with a survey study that preceded this work (IJsselsteijn, de Kort, & Poels, in preparation), the results indicated that presence of co-players significantly adds to the fun, challenge, and perceived competence in a game and therefore influences player enjoyment. Results of social effects on player involvement on the other hand have not been tested empirically yet. Some have suggested that others present may distract players from the game and potentially break their concentration (e.g., Sweetser & Wyeth, 2005), yet the popularity of social play appears to contradict this. This paper therefore focuses on experiential components describing a player's involvement when a co-player is either absent, co-present, or online, during digital game play.

Player Involvement

Immersion, engagement, and flow appear to lie at the heart of player experience, yet today the field still has not established consensus on the definitions of these and related terms. In

this paper we use the term *player involvement* as a generic name to denote the umbrella construct under which concepts are placed which describe a player's focus and interest during digital play. Unfortunately, as yet researchers use different names for overlapping experiences, and identical names for clearly different phenomena. We will briefly review the most relevant literature below.

Immersion is a metaphorical term originating from the experience of being submerged in water. In digital gaming it connotes the feeling of being surrounded by another reality, the reality of the game itself. Ermi and Mäyrä (2005) discuss a model for immersion in games which includes three components: sensory immersion - based on the audiovisual qualities of games -, imaginative immersion which is based on the fantasy of the game and identification with the game character, and challenge-based immersion - based on skills addressed in the game. We define immersion as the experience of being surrounded by the game as a result from the absorbing power of the game's audio, video, and narrative. In this sense the third component of Ermi and Mäyrä's model, challenge-based immersion, appears to fit better under the second component of game involvement: engagement.

We define *engagement* as the state of absorption in a game, where players appear cut off from the real world, forget everything around them and are deeply involved in the medium, mainly through the cognitive challenges posed to them. Brown and Cairns (2004) defined a model of game involvement containing three levels: engagement, engrossment, and total immersion. They propose that the level of engagement players experience during the game very much depends on the effort they put into the game, or are willing to put into it.

Flow is also prominent in discussions of gameplay and game experience. We adopted the definition of flow from Csikszentmihalyi (1975; 1988) who studied the enjoyment derived from

various sports and leisure activities. He stated that flow is the optimal experience where one is performing at best, is alert, is in effortless control and where one's sense of time is altered and sense of self is lost. There are no tangible rewards one gets from flow; however it is such a pleasant experience that people are willing to reach and maintain the state for its own sake (Csikszentmihalyi & Csikszentmihalyi, 1988). Although flow theory was not developed as an explanation of media enjoyment, the association between flow and digital games has been made frequently in the past decade (e.g. McKenna & Lee, 1995; Sweetser & Wyeth, 2005). The flow experience differs from engagement in the sense that flow is considered only to emerge when the players' skills and the games' challenges are optimally balanced.

The three concepts described above – immersion, engagement, and flow – are obviously related and show some overlap in terms of their phenomenology. Yet they do have their own typicalities and connotations with game characteristics. For instance, engagement to appealing personal challenges in the game, immersion to the richness and qualities of graphics, sounds, or narrative, and flow to the exact matching of challenges and skills ('optimal performance'). Besides these conceptual considerations, empirical findings confirm the multidimensionality of player involvement. In a large-scale empirical exploration of in-game player experiences (Game Experience Questionnaire; IJsselstein et al, in preparation) seven reliable components of player experience emerged in factor analyses: Challenge, Competence, Engagement/Flow, Frustration, Negative Affect/Boredom, Positive Affect/ Enjoyment, and Sensory & Imaginative Immersion. At least three of these reflect player involvement: 'immersion', 'boredom' (the antonym of engagement), and 'engagement/flow'. Yet the question of how these constructs relate to the social context of gaming has not been addressed before.

Player Experience Models

To date, even though some authors acknowledge the role of social elements in gaming, co-players and spectators are only marginally included in most player experience models (e.g. Sweetser & Wyeth, 2005; Ermi & Mäyry, 2005). As an exception, Calleja's (2007) model does explicitly acknowledge a social component, related to the consequences of one's performance, i.e., failing vs. succeeding, being visible to others in online play. Yet all current game experience models are insufficient for describing social processes such as shared enjoyment (Vallius, Manninen, & Kujanpää, 2006), or social anxiety and choking (Kimble & Rezabek, 1992), and for explaining social effects such as the increased challenge in competition (Vorderer, Hartmann & Klimmt, 2003). The general view in literature is that during game play other people provide players a link to the real world, potentially interrupting flow or immersion and pulling attention away from the game (Sweetser & Wyeth, 2005). After all, in essence these phenomena describe situations in which all attention is directed at the game, and from this perspective co-players can be considered a distraction. However, no empirical results were found in literature that supported this argument. Moreover, several studies contradict the argument of interrupting involvement by indicating that social interaction is the number one motivation for digital gaming (e.g. Nielsen, 2005; Jansz & Martens, 2005). Perhaps this apparent contrast explains why most scientists have been hesitant to adopt social components in their player experience models.

We argue that player experience can only be understood fully when the player's social context is also accounted for. To do so, we approach digital gaming with social presence theory. Social presence is defined as *the sense of being with another* (Biocca, Harms, & Burgoon, 2003). The concept has mainly been applied in respect to communication technology, but was recently

introduced in digital gaming research by de Kort, IJsselsteijn, & Poels (2007). In a preliminary study, Gajadhar et al. (2008b) showed that players' reported level of social presence varied, depending on whether they played against a computer agent (virtual other), a mediated other (online), or a co-located other, and whether they played against a stranger or a friend. Other empirical work had also indicated that the nature of the competitive situation is influenced by familiarity of the opponent and influences player experience (Ravaja, Saari, Turpeinen, Laarni, Slaminen, & Kivikangas, 2006).

In a subsequent study (2008a) Gajadhar et al. showed that competitive play in a richer social setting brings significantly more player enjoyment, i.e. more positive affect, competence and challenge. This effect was mediated by social presence. Although not addressed in that article, player involvement components were also measured in this particular study, in addition to components of player enjoyment. In the current article, results concerning player involvement are analysed and discussed, to test whether the player's focus was undermined by the presence of co-players whilst enjoyment clearly increased.

Method

Experimental design

To address the research question a mixed groups design was employed. Co-player Presence was manipulated as a within groups factor (virtual co-player vs. mediated co-player vs. co-located co-player). These three conditions represent very common and increasingly socially rich play configurations. The second factor - Familiarity between participants (Friends vs. Strangers) - was registered before the experiment started. The third factor - Performance (Winner vs. Loser) - was created post-hoc for each play session, based on players' scores in the

experiment. Player experience was measured with a combination of self-report measures after each session.

Participants

Eighty-six Dutch graduate and post graduate students (59 males), aged between 16 and 34 ($M_{\text{age}} = 22.4$; $SD_{\text{age}} = 3.5$), participated in the experiment. However, since participants played in dyads, and dyadic data are non-independent (Kenny, Kashy & Cook, 2006), only half of the data was actually used for the current analyses (the data of all players '1'). Therefore the actual sample size was 42 participants (27 males; 26 friends). Participants were recruited from a participant database via email, or approached during breaks in seminars at the university. All participants had played digital games before, a substantial number of them indicated they played them regularly.

Apparatus

The game *WoodPong* by Resinari (2005) was used in the experiments, displayed on a 17" monitor. This arcade-like game has simple controls and is thus easy to learn and has a short learning curve. Furthermore, the game has a non-violent character which prevents biased preferences in gender. Also it offers a clear outcome of winner and loser, which was necessary to include the effects of performance in player experience. *WoodPong* was derived from tennis: the player has to return the approaching ball and hit it towards the other player by controlling the bat (see Figure 1). The music and side effects within the game were played via a headphone which players wore in all conditions and were identical for both competing players.

-----<FIGURE 1 HERE>-----

Experimental manipulations and procedure

The experiment was conducted in the PsyLab at the Eindhoven University of Technology, consisting of eight separate participant booths. Participants were welcomed in pairs by the experimenter, entered the lab together, were asked to fill in a consent form and were led to believe that the purpose of the study concerned the effect of latency on player experience in digital games. For each experimental condition, participants were redirected to another booth where the social context was alternated: in the *virtual co-player* setting participants were told that they played against the computer (in separate rooms), although in fact they played against their partner (see below). In the *mediated co-player* setting the pairs played online against each other (in separate booths), and in the *co-located co-player* setting they played against each other in the same booth, on the same console (see Figure 2).

Based on the results of a pilot study (Gajadhar et al., 2008b) it was decided not to have participants play against the computer in the virtual co-player setting for two reasons (as also discussed in Gajadhar et al., 2008a). First, the design provided a confound as results revealed that all players lost their game against the AI. Second, in case there would be an effect of co-player presence, it would be impossible to attribute this to either the social meanings and affordances of the setting or - alternatively - to the fact that computers play with fixed algorithms and thus differently than humans. Instead, in the current experiment the virtual and the mediated co-player settings were in fact identical, except for the fact that players *thought* their co-players were AI instead of human. To make this difference more convincing, a visible cable was connected between the two computers in the mediated setting. However in the virtual setting, cables which connected both computers were unnoticeable. As a result, in all experimental

conditions participants played against the same (human) competitor which prevented any confounds by differences in difficulty level. The only difference between the settings was in their social meaning and richness, which increased from virtual to mediated to co-located play.

-----<FIGURE 2 HERE>-----

In each condition, three sets of *WoodPong* were played. A set was started by the experimenter via a wireless keyboard, and ended automatically after one of the participants won six points. After three sets a winner was noted, and the request to fill in a questionnaire appeared on both participants' displays (always filled in, in separate rooms). The order of settings was randomly assigned per couple. Lastly, they were debriefed, paid and thanked for their participation. The experiment lasted 30 minutes; participants received a standard compensation of €5,-.

Measurement instruments

After each condition, participants completed a set of self-report measures in which they rated their experiences during the game. The combined questionnaire probed three categories of experiences: player enjoyment, player involvement, and social presence. Results relating to the first category - enjoyment - are addressed in a separate publication (Gajadhar et al., 2008a) and will not be reported here.

Player involvement was measured with six scales; four were (derived) from the Game Experience Questionnaire, two were constructed especially for this experiment. Two additional social presence scales were employed as manipulation check.

Immersion was probed with two scales. The GEQ-Immersion scale was split into a part probing sensory immersion and one probing imaginative/narrative immersion. As each component consisted of only three items, one additional item was constructed for each. Reliability for Sensory Immersion with items such as '*it was aesthetically pleasing*', and '*the audio and visual effects together made the game more interesting*' (new), ranged between .68 and .74. Imaginative Immersion with items such as '*I was interested in the game's story*', and '*the story of the game kept me playing*', also had a reliability between .68 and .74.

Engagement was probed with the GEQ-Boredom and the GEQ-Flow/Engagement scales. GEQ-Boredom (3 items) measures negative affect, in particular related to feeling bored and distracted during the game, in other words it is a reversed engagement scale. Its reliability varied between .66 and .90. The GEQ-Flow/Engagement scale (3 items) measures the degree of absorption and the experience of being cut off from the real world. Its reliability ranged between .87 and .93 for the three experimental settings.

Since it was felt that the GEQ-Flow/Engagement scale did not perfectly target the *optimal* experience as described by Csikszentmihalyi (1975; 1988), a new scale was constructed with 4 items such as '*for a moment it felt as if I succeeded in all my actions*', and '*sometimes it felt as if my fingers were pushing the buttons automatically*'. This Revised-Flow scale had reliability between .63 and .70.

As involvement potentially also relates to the willingness to learn and refine skills for a better performance, a new scale was constructed, consisting of 3 items such as '*I wanted to become better in the game*', and '*I wanted to be a natural at playing the game*', this Performance Improvement Drive scale had reliabilities between .73 and .83.

Two subscales from the Social Presence in Gaming Questionnaire (SPGQ, de Kort et al., 2007) were administered to verify the manipulation of social presence in the three play configurations under study: SPGQ-Psychological Involvement (SPGQ-PI) with a reliability ranging from .66 to .79, and SPGQ-Behavioral Engagement (SPGQ-BE) with a Cronbach's Alfa between .85 and .91.

The combined questionnaire included 55 items. Participants could respond on 5-point unipolar scales, ranging from 1 (not at all) to 5 (extremely), to indicate the intensity of the described experience. Additionally, all in-game scores were logged to determine whether players had won or lost (post-hoc constructed Performance factor).

Results

Mixed Model Analysis was performed on each of the self-report scales of player involvement with Co-Player Presence, Familiarity, and Performance as fixed factors; participant number was set as random factor. First the social presence manipulation check is reported, after which the effects on the dependent variables are analyzed.

Social Presence Manipulation Check

As was also discussed in Gajadhar et al. (2008a), Linear Mixed Model Analysis was performed on each component of the SPGQ with Co-Player Presence, Familiarity, and Performance as fixed factors, and participant number as random factor. As intended, results revealed significant differences for Co-Player Presence on both social presence scales: psychological involvement (SPGQ-PI, $F(2,80.2) = 82.88; p < .001$) and behavioral engagement (SPGQ-BE, $F(2,77.8) = 9.31; p < .001$). Co-located co-play scored highest on both scales ($M_{BE} =$

3.1 (0.2); $M_{PI} = 2.8$ (0.1))¹, mediated co-play scored in between ($M_{BE} = 2.8$ (0.2); $M_{PI} = 1.7$ (0.1)), and virtual co-play was rated lowest on both social presence scales ($M_{BE} = 2.5$ (0.2); $M_{PI} = 1.2$ (0.1)). Contrast analyses showed that scores increased significantly with each subsequent category ($p < .03$), however the difference for SPGQ-BE between virtual and mediated co-play ($p < .06$) was only marginally significant (see Figure 3).

-----<FIGURE 3 HERE>-----

In addition, SPGQ-PI also revealed a significant main effect of Familiarity ($F(1,39.7) = 10.66$; $p < .01$) and a significant interaction effect between Familiarity and Co-Player Presence ($F(2,78.2) = 3.61$; $p < .04$). Strangers ($M = 1.7$ (0.1)) experienced less psychological involvement than friends ($M = 2.1$ (0.1); $p < .01$), and the increase for each subsequent category of Co-Player Presence was smaller for strangers than for friends. Logically, the values were equal in virtual co-play.

Player Involvement

Player Involvement was measured with six scales: GEQ-Sensory Immersion, GEQ-Imaginative Immersion, GEQ-Flow/Engagement, GEQ-Boredom, Revised-Flow, and Performance Improvement Drive. Table 1 shows the bivariate correlations between the components, revealing a strong relationship between the sensory and imaginative immersion components². Moreover, with the exception of GEQ-Boredom, significant correlations emerged between all components.

-----<TABLE 1 HERE>-----

Linear Mixed Model Analyses were performed for each component of Player Involvement with Co-Player Presence as a within groups factor, and Familiarity and Performance as between groups factors. A schematic overview of significant differences of Co-Player Presence, Familiarity, Performance and their interaction effects on each involvement scale is given in Table 2.

-----<TABLE 2 HERE>-----

As is shown in Figure 4a, three subscales showed modest, yet significant differences for the three levels of Co-Player Presence. Analyses revealed significant main effects of Co-Player Presence on GEQ-Boredom ($F(2,79.0) = 3.51, p < .04$), Imaginative Immersion ($F(2,77.8) = 3.95, p < .03$), and Revised-Flow ($F(2,78.4) = 4.96, p < .01$). Subsequent contrast analyses showed that GEQ-Boredom was significantly higher in virtual co-play ($M = 1.6 (0.1)$) than in mediated ($M = 1.4 (0.1); p < .04$) and co-located ($M = 1.4 (0.1); p < .02$) co-play. Furthermore, Imaginative Immersion was significantly higher for co-located play ($M = 1.8 (0.1)$) than for mediated ($M = 1.6 (0.1); p < .02$) and virtual ($M = 1.6 (0.1); p < .02$) co-play. Similarly, contrast analyses showed that Revised-Flow was significantly higher for co-located ($M = 2.7 (0.1)$) than for virtual co-play ($M = 2.4 (0.1); p < .01$); the contrast between mediated ($M = 2.5 (0.1)$) and co-located co-play was marginally significant ($p < .08$).

-----<FIGURE 4 HERE>-----

Performance showed significant main effects on Revised-Flow ($F(1,98.3) = 16.53$, $p < .001$) and Performance Improvement Drive ($F(1,112.0) = 4.14$, $p < .05$), see Figure 4b. Winners ($M = 2.8$ (0.1)) reported more flow than losers ($M = 2.3$ (0.1); $p < .001$). In contrast, winners ($M = 3.3$ (0.1)) reported a lower performance improvement drive than losers ($M = 3.6$ (0.1); $p < .05$).

Discussion

To test whether co-players influence player involvement, we performed an empirical study exploring the effect of co-player presence on player experience in a competitive setting. Furthermore, differences in familiarity and winning vs. losing were accounted for, as previous work had indicated that these factors influence player experience as well. In contrast to what some scholars have suggested in the literature (e.g., Sweetser & Wyeth, 2005) the current study showed that the presence of co-players does not present a threat to game involvement. The results indicated that although it was hypothesized that others might interrupt a player's attention to the game, players' involvement and engagement in WoodPong was not reduced by others' presence. In fact, some indicators of involvement even showed modest improvements with more social settings.

Manipulation of Social Setting

A manipulation check indicated that social presence increased for each subsequent setting; virtual co-play was rated as the one in which co-player's presence was experienced the least and co-located co-play was experienced the most, with intermediate scores for the mediated co-play setting. This was reflected in both social presence subscales: psychological involvement and behavioral engagement. We can therefore conclude that the manipulation in social presence

was successful: in the mediated and even more so in the co-located co-play setting, players were more aware of each other, felt more connected to each other, and their in-game actions depended more on the other.

To account for familiarity, differences in social presence were tested for friends vs. strangers. In line with de Kort, IJsselsteijn, and Poels (2007), the stronger emotional ties between friends translated into higher scores and a stronger increment of ratings in psychological involvement between settings for friends than strangers.

Player Involvement

In spite of their increased awareness of the other player, players' involvement in the game was not reduced in the two (human) co-play settings. On the contrary, players even scored higher levels of imaginative immersion and flow (revised-flow scale), and reported less boredom; the other scales (GEQ-flow/engagement, sensory immersion and performance improvement drive) showed no differences and were insensitive to varying social settings.

Imaginative immersion and flow were higher in the co-located setting than the other two settings. This indicates that "the story of the game" (which in WoodPong is nothing more than the chronological course of the scores) was experienced as more involving when both competitors could see and hear each other. Co-located play also enabled discussions of in-game moments, potentially drawing both players into the game even more. The level of flow players experienced did not drop as Sweetser and Wyeth (2005) hypothesized. If anything, gamers came closer to Csikszentmihalyi's (1975; 1988) optimal experience, in spite of their increased awareness of the other, residing in 'the real world'. Apparently the presence of the other player does not break the spell of the game, or prevent them from entering 'the zone'.

The boredom players experienced was higher in the virtual play setting than in both social settings. Perhaps competing with a non-human entity was perceived as less meaningful or challenging than competing with a virtual opponent. Considering the low scores on boredom overall, it can be concluded that the whole activity of playing digital games generally was engaging.

Perhaps it is good to briefly reflect here on the difference between the current findings and the results on the enjoyment-related scales, reported in Gajadhar et al., 2008a. Although here again we found positive effects of social context on components of player experience, the effects were substantially smaller than those reported for enjoyment. Moreover, effects of social setting on involvement components were not mediated by social presence, in contrast to the effects on enjoyment. For enjoyment components of player experience we argued that the richness of social cues afforded interpersonal dynamics during play - e.g., immediacy, reciprocation, mimicry - and via this route enabled social processes such as emotional contagion, reinforcement and affiliation fuelling enjoyment of the experience. In contrast, we cannot draw the same conclusions for components of involvement. Instead we suspect that the effects of the sociality of the setting must have been more indirect – perhaps via enjoyment – or based on the more explicit competitive nature of the game setting when playing against a co-present opponent instead of a distant, invisible one, or when playing against a human opponent instead of a fictitious one. Further research is needed to reveal the mechanisms underlying these results.

Beforehand, it was hypothesized that familiarity would influence components of player involvement as it did with psychological involvement and other studies (e.g. Ravaja et al., 2006). Although in some graphs a trend did appear present, none of them turned out to be significant. Effects of this manipulation on player enjoyment were also absent (Gajadhar et al., 2008a).

Perhaps the familiarity manipulation was not strong enough in the current sample of participants. Most of the participants were freshmen, and when probed whether they were friends or not with their co-participant, with him/her present, reported either that they did not know each other yet, or that they were friends. Yet in fact many of them had only met since the start of the school year, which was just two months ago. Hence the measurement was fairly coarse and may have not distinguished properly between familiarity and friendship. Perhaps it would have been better to have probed their relationship on a scale instead of in a dichotomous fashion. Therefore, conclusions regarding familiarity from this experiment have to be dealt with care.

Players' performance was reflected in two indicators of involvement. Flow (revised-flow scale) was higher among winning participants, whereas their drive towards performance improvement was lower. Since this factor was created post-hoc (winning or losing was not manipulated but measured), the causality remains unclear. It does however seem likely that those players who lost focused on the fact that they wanted to become better at playing, whereas those who won felt more in control and on top of the situation. The findings do indicate that these indicators tap into different experiences.

The results presented here are based on the experiences in one specific digital game. This particular game belongs to the class of classic arcade games, and is a very early example of games in the sports genre. Choosing a game from a different genre – such as First Person Shooter (FPS), adventure, role playing - most likely would have influenced our results based on other features such as a higher level of violence, the ability to play with more than 2 co-players, or a captivating and highly immersive narrative. Also, we have only considered competitive playing modes. Experiences of social presence may well differ for collaborative playing modes and as a result influence player experience differently. However, results in the current empirical study are

supported by earlier findings in a survey study, in which a range of game genres and playing modes were considered (IJsselsteijn et al., in preparation). We therefore expect that our results may be influenced by differences in genres and roles of the co-player, however not in a way that will violate our main conclusions. Nevertheless, we are currently planning additional studies that will employ different games and address just this difference in playing mode.

Conclusion

The aim of our research was to understand the influence of social context on player experience, in particular on experience components related to involvement or the attentional pull of the game. Earlier analyses had demonstrated that player enjoyment - a second class of player experiences - increased with increasing social richness of the play setting. Moreover, this effect was mediated by the players' experienced social presence, in other words, their awareness of and connectedness to the other (Gajadhar et al., 2008a). In the present analyses we investigated whether similar effects would occur for players' involvement in games.

To our best knowledge, writings on this matter have mostly been conceptual or theoretical. Some speculated that other persons present would, as any other external stimuli, negatively affect a player's concentration on and engagement in a game. On the other hand, others reflected on the popularity of multi-player games and the positive effects of co-players on game enjoyment and conjectured similar paths for player involvement. These contradictions perhaps explain why scholars have been hesitant to adopt social components in their player experience models.

From our results we can conclude that player involvement is not necessarily impaired by others present. If anything, co-players contributed to the players' involvement in the game. The

measurements of social presence furthermore indicate that players did not forget or ignore their competitors: they became more aware of them and felt more connected to them. These findings imply that co-players in fact become part of the game or game world and should not be considered external distracters.

The effects of social setting on player involvement do differ from those on player enjoyment. For this latter class of experiences, effects of social setting were stronger and clearly mediated by social presence, which was not the case for involvement. We argue that models of player experience that do not take the social play setting into account are severely incomplete. Furthermore, we propose that different relationships exist between this variable and two related, yet different classes of player experience: involvement and enjoyment. These classes therefore deserve different positions in such a model.

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Footnotes

¹. Standard errors in brackets

². In the Game Experience Questionnaire, the sensory and imaginative immersion components do in fact belong to one scale.

Table 1

Pearson Correlations for Player Involvement components from participant's self-reports of all settings.

	GEQ – Boredom	GEQ-Flow/ Engagement	Sensory Immersion	Imaginative Immersion	Revised - Flow	Performance Improvement Drive
GEQ-Boredom	1	-.19*	-.17	-.18*	-.07	-.28**
GEQ-Flow/Engagement	-.19*	1	.49**	.43**	.34**	.42**
Sensory Immersion	-.17	.49**	1	.76**	.35**	.25**
Imaginative Immersion	-.18*	.43**	.76**	1	.32**	.23**
Revised-Flow	-.07	.34**	.35**	.32**	1	.19*
Performance Improvement Drive	-.28**	.42**	.25**	.23**	.19*	1

Note. ** Significant at the 0.01 level; * Significant at the 0.05 level

Table 2

*Schematic overview of the presence of significant differences for each scale in Co-Player Presence (CPP), Familiarity (Fam.), Performance (Perf.) and their interaction effects (CPP*Fam. and CPP*Perf.).*

	GEQ- Boredom	GEQ-Flow/ Engagement	Sensory Immersion	Imaginative Immersion	Revised- Flow	Performance Improvement Drive
CPP	*	-	-	*	**	-
Fam.	-	-	-	-	-	-
Perf.	-	-	-	-	**	*
CPP*Fam.	-	-	-	-	-	-
CPP*Perf.	-	-	-	-	-	-

Note. ** Significant at the 0.01 level; * Significant at the 0.05 level

Figure 1. Interface of WoodPong where both slices of the same color are simultaneously controlled by the keyboard; the game stops when one of the players has 6 points.

Figure 2. (a) Setting in virtual and mediated co-playing. (b) Setting in co-located co-playing.

Note that in all settings each participant actually played against the same competitor.

Figure 3. Social Presence as a function of Co-Player Presence (1 = not at all, 5 = extremely; SE indicated in graph).

Figure 4. (a) Player Experience as a function of Co-Player Presence, (b) Player Experience as a function of Performance (1 = not at all, 5 = extremely; SE indicated in graph).