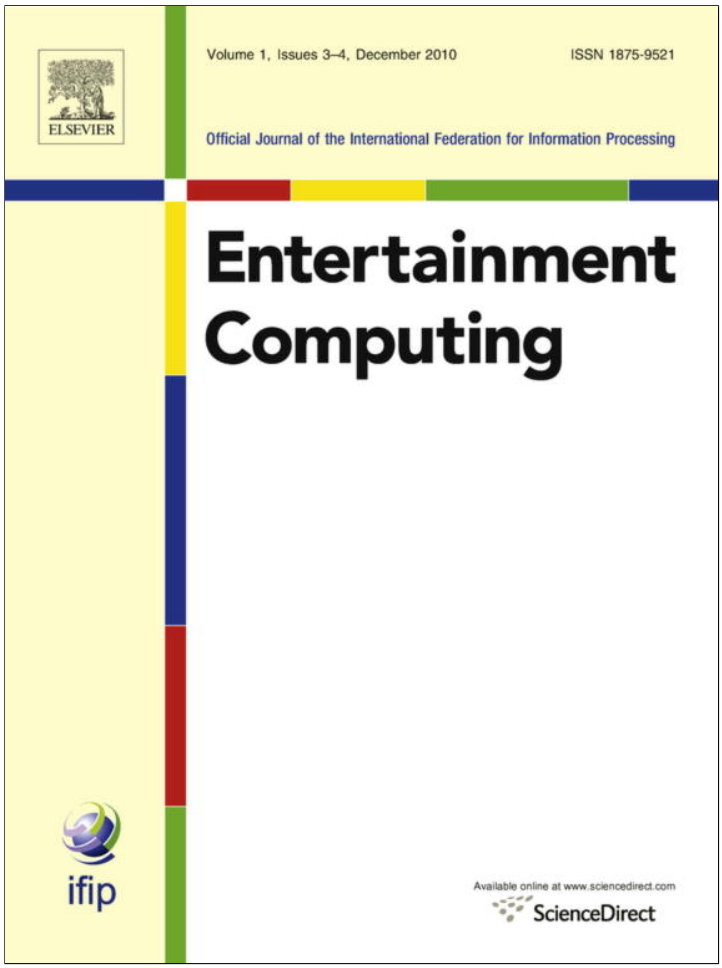

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Interrogating social presence in games with experiential vignettes ☆

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ABSTRACT

Increasingly digital games are being played multiplayer online, not just massively multiplayer games but normal PC and console games. An important constituent of the gaming experience is the social relationships between players as mediated by games. Social presence is the foundation of this experience, being the extent to which players feel present to each other within the virtual environment. This paper sets out to explore the nature of social presence in digital games. Though substantial work has already been done in this area, our first study makes it clear that current formulations of social presence in games are only capturing certain aspects of gaming experience. We therefore conducted three other small scale, largely qualitative studies that set out to manipulate social presence in games, in particular using the ambiguity of whether co-players are human to probe the relevance of social presence. We term this novel methodological approach experiential vignettes. The vignettes show that, despite what players say, they are highly task-oriented when it comes to whether the presence of other humans is meaningful in game. Moreover, current measures of social presence in games are not sufficiently rich to capture the full extent to which social presence can occur in games.

1. Introduction

PC games and digital game platforms like Microsoft's XBox and the Sony PlayStation are increasingly offering multiplayer experiences. Whereas most games will have an individual player version, often this is but a lesser sibling to the much bigger online experience that the game can offer. For example, *Call of Duty: Black Ops* is one of the most successful games in recent times, having sales worth over $1 billion, however the single player part of the game is not particularly highly rated (e.g. gamespot.com). Rather it is in the online multiplayer parts that the game offers the best experiences.

When it comes to studying the gaming experience of online multiplayer games, understandably, it has been somewhat dominated by the Massively Multiplayer Online (MMO) games like *World of Warcraft* and *Everquest*. The multiplayer aspect of these games is intrinsic to the games and indeed forms the core of the experience of playing these games. By comparison, there is relatively little work in studying the experience of playing other multiplayer games, despite that these may actually be equally prevalent forms of social games. And within this, the dominant consideration has been in terms of competitive play. Indeed, the Gaming Experience Questionnaire, unpublished but mentioned in a number of papers, for example [15], aims to capture the full breadth of the gaming experience so understandably includes a social component. This is measured in a separate module the Social Presence in Gaming Questionnaire (SPGQ) [15]. This module was carefully developed and consists of three components: behavioural involvement, psychological involvement – empathy, psychological involvement – negative feelings. Even from this though, it is strongly suggestive that the SPGQ is only suited to games where players are enemies – for example negative feelings of the sort specified in the SPGQ may be entirely absent in collaborative games regardless of how socially present players feel towards each other.

Of course in MMO games, players surely do feel social presence but the virtual worlds are so rich and socially populated that simply referring to it as social presence does not do justice the extent of human experience within these games. For example, [55,56] in particular has documented extensively how players project their identity into these games, fall in love and build or develop existing family or friendship bonds. Many games, for example *Call of Duty*, not only do not offer the opportunity for such rich interaction but it would be a very odd game of *Call of Duty* where it did! There are of course opportunities for friendships and social bonds to arise in the communities and clans which grow around such games, however it is the role of social presence within these latter, less obviously social, games that is the focus of this paper.

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The original intention of this work was to investigate the nature of social presence, building on previous work [20,12], but relating it to games with a collaborative rather than competitive component. The first study therefore investigated the gaming experience in collaborative Tetris. However, in this study, it immediately became clear that the current views of social presence in games, particularly that represented by the SPGQ, are not sufficient to understand social presence in this context. We therefore moved to explore more carefully the dimensions and range of social presence in games, and given the openness of our goals, we opted for a new approach which we are calling experiential vignettes. These are basically small-scale qualitative studies, but rather than relying on pure observation of qualitative data, we set up situations that aimed to manipulate the way players thought about games. Through these vignettes, the intention was to elicit a more wide-reaching account of social presence by requiring players to bring to mind less obvious aspects of what it means to play socially. In particular, we used ambiguity of whether other players were real people or virtual agents as a way to provoke players to think more deeply about the role of other people in games, and therefore probe the nature of social presence. What is made clear through the vignettes is that social presence is not simply a matter of the player configuration in both the physical and game worlds but that it is also the nature of the game in hand that influences the sense of social presence. Thus, previous models of social presence in games are at risk of bias because they did not explicitly explore the variety of social contexts in which games can be played. This is not to say that the work reported here is the last word either but rather that we have deliberately attempted to explore different games with different gameplays and moreover, through the vignette approach, manipulate and probe the social contexts of the games considered. The results show that a richer account based on a wider base of gaming experiences is needed to describe the complexities of social presence in games.

It may also seem desirable to have much larger studies to explore social presence rather than the small-scale vignettes. However, substantial quantitative experiments would not be effective without useful measures of social presence, which we would hold do not yet exist, and moreover would naturally be constrained to focus on a particular game. Qualitative studies are much better suited to exploring such subjective experiences like social presence and in which case, it is not so much the quantity of data that is important but the quality. The experiential vignette form of the studies was used to be flexible depending on what each study found and to allow players to express the richness and complexity of their expectations and actual experiences. This resulted in a substantial but varied dataset that offered a more complex appreciation of the nature of social presence in games.

2. Background

2.1. Social presence in gaming

Social presence is one aspect of a more general sensation of presence in virtual environments [34]. One common view of presence is that it is the illusion of non-mediation, that is, experiencing interactions mediated via a digital system as if they were not mediated. However Cairns et al. [13] argue that presence occurs "when the hypothesis on the virtual environment wins out over that of the real world. In some sense then, presence is the sensation of being somewhere else knowing that you are not. When we really are somewhere, there is no sense of presence as there is no conflicting perceptual hypothesis to be resolved". Supporting this view Sanchez-Vives and Slater [46] argue that while presence is the phenomenon of acting and feeling as if one is in the environment created by computer displays, one is simultaneously conscious of the fact that there is no environment. Based on a critical analysis of the *presence as epistemic failure* theory, Floridi [18] also suggests that presence is not a 'failure to perceive' the mediation, but can be defined by an observable presence, in other words, we are present in an environment if we have an observable effect on that environment.

Presence is typically divided into spatial components, the sense of being in a virtual space, and social components, the sense of being with others. So for example, Biocca et al. [5] state that social presence is the sense of being together with another. Schouten [48] argues that social presence is a concept built around the evidence of other humans within a virtual environment, with even simple cues such as the score of other players in a computer game being enough to increase social presence. As such, social presence is similar to the concept of 'Shared Involvement', introduced by Calleja [14]. Shared Involvement in games is the sense of being with other entities in a common environment, whether that involvement consists of explicit communication, working together, or "simply being aware that actions are occurring in a shared context". Calleja [14] argues that this feeling is enhanced by cooperation in competitive environments such as team based online FPS games.

Social presence may also be experienced to varying definable levels, from simply perceiving the co-presence of other entities, to a deeper sense of psychological involvement with the other entities, and finally a sense of behavioural engagement in which there is perceived mutual social presence [4,3]. These steps of depth are similar to the Brown and Cairs [9] model of immersion. Immersion is the sense of being cognitively engaged in a task as in the sense of being immersed in the activity. A player's level of immersion can vary from simply attending to a medium, to engaging with it and on to total immersion. Cairns et al. [13] argue that immersion and presence are entirely separate concepts (though they can occur together), giving the example of the game Tetris. In Tetris "there is little sense of 'being there' in this game as there is simply no 'there' for a player to be and yet the game is hugely absorbing and provides a strong immersive experience". In a study by Brown and Cairns [12] the interplay between immersion and social interaction/presence was explored, finding that immersion and presence did not seem to clearly correlate in a competitive game. Rather, it was sufficient for players to know they were playing another player (wherever located) to increase immersion but social presence, as might be expected, also increased if the players were in the same room.

2.2. Humans vs. bots

In the digital world, there is always the possibility that players are not playing other people but computer-based agents or bots, and this therefore probes at the role of social presence in the gaming experience. There have been a number of studies of how the perception of the agency of other entities within a virtual environment affect player experience. In one such study by Weibel et al. [54] groups of participants collaborated together on a multiplayer role-playing game to play against other groups of players. Some groups were informed they were playing against bots, and other groups against humans. It was reported that in this study the group who thought they were playing the humans felt a "greater sense of immersion and greater enjoyment" in addition to a greater sense of engagement and flow [54]. In another study investigating the effects of the perception of other entities within competitive/cooperative gaming environment, Lima and Reeves [33] found that participants not only "exhibited greater physiological arousal to otherwise identical interactions" when they assumed the other entities were controlled by humans rather than the computer, but also that participants generally disliked having a bot as a

competitor. While participants in the Lima and Reeves [33] study experienced the same emotional attachment and feeling of presence with a human competitive or cooperative co-player, competing against a bot caused these measures to drop significantly. In a study focusing on the player's opinion of the in-game actions of bots and players it was found that "if an artificial team-mate engages in risk-taking in order to help a human player, it is more likely to go unnoticed than if the team-mate is human" [38]. An experiment by Gallagher et al. [21] also suggests that playing a game, even something as simple as *rock, paper, scissors* against a computer 'feels' different. This is likely due to the lack of the theory of mind, the capacity to analyse other's actions through mental simulation, simulating other minds simulating our minds [2,43], which is not available to players when playing against a computer or vice versa. While the mechanics of playing a computer game against a human and bot may be the same, there is something intangibly different about playing a human. When playing *rock, paper, scissors* against a black-box computer system, the player may as well be guessing the outcome of a dice roll, while it is possible to become proficient at *rock, paper, scissors* against human opponents (there is even a 'World Champion'.[1]

2.3. Measuring social presence

In order to see the effect of social presence on the gaming experience (or any experience of digitally-mediated interaction), it is important to be able to know what social presence people are experiencing. This is typically done through measuring social presence in some way, often through questionnaires. However, previous research into the measurement of social presence is heavily influenced by the field of study from which it comes, and the underlying theory of social presence the researchers have. Much of the previous research dedicated to finding a way to measure social presence has occurred within the field of distributed learning and online education. In a review of various measures of social presence in an online learning context Kreijns et al. [31] cites a number of potential tools, including a 'Group Atmosphere Scale' [16,17], a 'Work-Group Cohe-siveness Index' [42], 'Social Presence Scales and Indicators' [23,24], and their own 'Sociability' and 'Social Space' scales [29,30]. Work distributed group learning usually focuses on developing questionnaires to measure social presence. The 'Social Space Scale' and 'Sociability Scale' developed by Kreijns et al. [29,30] were questionnaire based measures designed to assess the perceived frequency and quality of communication within a virtual social learning space. Similarly Gunawardena and Zittle [24] developed a questionnaire which was used to measure the extent to which the a specific technology facilitated social learning. This focus on the perceived quality of the experience is to be expected of research concerned with online learning, where the positive perception students have of a course/teaching method is important.

In a comprehensive review of presence measures Van Baren and IJsselsteijn [51] set out the details of 28 current presence questionnaires, six of which claimed to measure social presence, some original, some developed by combining older telepresence questionnaires. These questionnaires were the Lombard et al. [35] Questionnaire, the Nowak and Biocca [40] Questionnaire, the Schroeder et al. [49] Questionnaire, the Bailenson et al. [1] Questionnaire, and the Temple Presence.

Inventory (TPI) [36]. However most of these questionnaires are unsuitable for measuring social presence in complex multi-user virtual environments such as team-based online games. Some were developed around the idea of presence in TV and Film and so cannot apply to the interactive nature of presence in games [35,36]. Others do not measure the concept of social awareness, the awareness of other conscious entities in the virtual environment [40], and some seemed to actually be measuring spatial rather than social presence [49]. Bailenson et al. [1] Questionnaire was a minimal and direct measure which aimed to measure only social presence, and would likely be effective in measuring social presence in a setting such as in non-competitive virtual environments, virtual meetings, etc. However it lacks the competitive/cooperative elements which are important to video games and team based training in virtual environments. In the Van Baren and IJsselsteijn [51] report questionnaires appeared to be the most prevalent method of measuring presence however there were also examples of other methods. Autoconfirmation [44] is a method in which users are shown a video of their actions within a virtual environment and are asked to give a commentary of their retrospective thoughts and feelings. This method has also been used in immersion research by Gow et al. [22]. Other methods Baren and IJsselsteijn [51] reported for qualitatively measuring presence included Content Analysis of transcripts of online text-based interaction [45], Ethnographic Observation of users of teleremote technology [37], and Focus Group explorations [19]. In some complex virtual situations multiple measures may be required, from questionnaires to interviews and observation, an example of this style of multi-thread measurement was used by Wagner et al. [53], who used a number of mixed reality technologies to evaluate user experience, and multiple methodologies to gather data.

Overall then, there are many approaches to measuring social presence and they are often quite strongly tailored to the particular application domain in mind. Not all are therefore even applicable in the context of digital games. The most socially focused gaming experience questionnaire is the SPGQ [15]. The SPGQ is based upon the Networked Minds Measure [3]. While the Networked Minds Measure has a strong theoretical underpinning, the questionnaire was primarily designed for teleconferencing, and was therefore modified based on focus group discussion with gamers. It splits social presence into three distinct types: Psychological Involvement-Empathy (PI-E), being the extent to which a player feels the mood and emotions of the other player; Psychological Involvement-Negative Feelings (PI-N), being the extent to which the player delights in the misfortune of the other player; and Behavioural Involvement (BI), being the (perceived) extent to which the behaviour of each player influences the other. Each of these components is viewed as independent aspects of social presence are measured with distinct sets of items in the SPGQ.

3. Experiential vignettes

The idea of vignettes was born from the problems with studying user experience, specifically, the concept of social presence that was yet to be well defined and understood in the context of digital games. While there has been work on how and where this concept is experienced [52,15,47,25], the focus of the studies is often narrow and there are still many unknowns, for example how different virtual environments affect social presence, the difference between games and virtual reality, or the interplay between immersion and social presence. In addition, while it seems obvious that gameplay itself is an important constituent in influencing social presence, this has not been a substantial consideration in the literature in this area. Therefore we have found that when studying social presence in a particular context, in our case games, it was important to view the concept from a number of perspectives and gather user experience using multiple tools in a variety of gaming contexts, to help get a better picture of the concept and a better awareness of some of the unknowns.

[1] http://worldrps.com/.

Experiential vignettes are quick probes into a concept, experiments, or quantitative or qualitative studies which can be quickly set-up, run, and evaluated. The vignettes in this paper are basically small-scale qualitative studies that provide opportunities for players to talk about their experiences in the context of having played particular games, but where we the researchers have made an explicit manipulation or probe that aims to stretch the normal expectations of players. The resulting data can allow for ethnographic style observations of user behaviour or provide behavioural data or also discourse data, which here was thematically analysed. These multiple small scale studies can provide a guide to further research, acting as test-beds for methodology, and can be used to rapidly probe a single complex concept from a variety of perspectives. The vignettes benefit from being almost 'throw away' studies, while we have found our studies very useful and combine to form some very interesting insights, they take far less time and effort to organise than a large user study.

This is not to say that the experiential vignettes are merely pilots for "proper" studies that were not done. Rather, qualitative studies are not about generalizability but are used to gain insights and to generate hypotheses. Similar to the quite small grounded theory study of Brown and Cairns [9], the vignettes provide useful, unexpected insights in this particular context. To conduct a large scale repetition of the same study would not necessarily stretch our insights beyond these initial findings. Instead, further vignettes are used to move the exploration explicitly beyond the insights already gained and in different contexts of games and gameplay.

This method of using multiple studies to explore a single issue is similar to the structure of the paper by Wagner et al. [53], in which three different mixed reality presence studies are documented and the findings combined to form a single argument. Wagner et al. [53] used a number of mixed reality technologies, and used a combination of an ethnographic style observation method, interviews, and a presence questionnaire to gather data. It was argued that this range of methods was needed to evaluate mixed reality as it is far more complex than standard VR applications. It is our view that our subject for investigation, multi-user team based games (often with competitive and cooperative elements), are also complex virtual environments. Following this example our vignettes were based on a variety of gaming technologies and media, using a synthesis of different styles of qualitative study, including questionnaires, ethnographic style observations and group interviews to gather data.

3.1. Vignette 1: collaborative tetris

This first study was intended as a formal experiment replicating the work of Gajadhar et al. [20] and Cairns et al. [12] in the context of collaborative games. Participants played a game in one of three social contexts: playing with a computer (non-human or bot), playing with a mediated (non co-located) human, and playing with a co-located human. However, unlike the previous work, here the participants were playing in collaboration with the other entity, not against them.

In piloting with six players though, it was found that players struggled to answer the SPGQ that we used to measure social presence, despite its effectiveness in the earlier work. Four of the questions were about the perceived happiness or mood of the player's teammate which in the context of the game used, players felt themselves unable to comment on. The question of feeling schadenfreude to the co-player was also peculiar in the context of this study. All five of these questions were omitted. The used version therefore consisted of: all 6 items of the Behavioural Involvement scale, 4 of the 6 Psychological Involvement-Empathy scale and 2 items of the 5 Psychological Involvement-Negative Feelings scale. However, as we had concerns that this would miss the social interactions between players, we added 10 five-point Likert scale statements related to the actions and goals of the players as a team. These we have dubbed the TeamPlay Questionnaire. These statements are all phrased in terms of the teammate (rather than other player or opponent) and asked about effort, for example, "I made an effort to work with my teammate" and vice versa, tactics, communication and shared aims and goals.

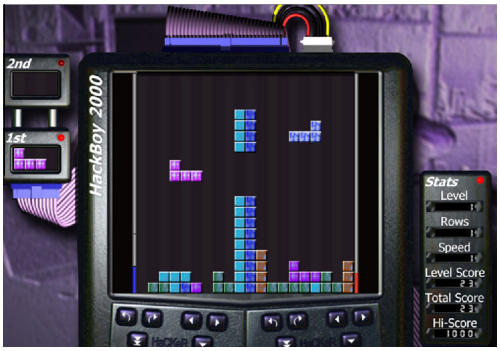

Fig. 1. An example screenshot of HaCKeR coop mode.

The use of these questionnaires means that the experiment would be relying on questionnaires that were not properly validated. This does not necessarily mean that the results would be invalid but we recognised that we would need to explore the data more carefully. Post-game interviews were therefore also added to help us capture the reported experiences of players. It is from this relaxation of a rigid experimental structure that the notion of the experiential vignettes emerged. Nonetheless, in this vignette, we maintained the structure of an experiment simply because the study was fully planned as such and it did not seem necessary to completely redesign the study from scratch.

3.1.1. Game used

Tetris was chosen as this experiment aimed to test only social presence within a virtual cooperative environment and was not concerned with spatial presence. As the interplay between social and spatial presence has yet to be explored, it was considered prudent that this variable be removed. Unlike many games which employ graphics to induce a sense of place to the player, Tetris is a game which involves very little (if any) sense of spatial presence, even compared to other very simple games, like Mario Kart, where there is a *there* for our mind to be. Additionally, it has only limited opportunities for interaction at a social level thus removing the components of social presence based on the social richness of the game and the social agency of the game (as opposed to the other players in it). The game chosen for this study was *HaCker*[2] Tetris, see Fig. 1, which was used primarily because it was one of the only Tetris games to support an online and Lan cooperative feature. The coop Tetris has no voice or text based communication and so players were only able to communicate in the most basic of ways, by moving their blocks in a way which may suggest intent to the other player. Verbal communication between non-colocated players could have been simply established using VOIP applications such as Team Speak, however in this experiment VOIP was not used in an attempt to keep the number of variables down. While voice communication is regarded as important in creating a social environment in online games the studies in this paper are investigating the phenomena of social presence not the building of social relationships (see Fig. 2).

3.1.2. Design

The study had a between subjects design. The three conditions were playing together with a person in the same room (colocated

[2] http://www.gameplayheaven.com/hacker.html.

Fig. 2. *Puji* in play.

condition), playing another person but physically separated (online) and playing another person but being told they were playing a bot (bot condition). This replicates the conditions of the studies in Gajadhar et al. [20] and Cairns et al. [12]. The dependent variables measured were immersion and social presence using the Immersive Experience Questionnaire [28] and the modified SPGQ [15]. It was expected that the level of social presence would vary between each of the three conditions with those in the bot condition experiencing least and those colocated experiencing most. Immersion, based on the previous results, was expected to differ only between the bot and online condition with the online and colocated conditions having comparable levels of immersion.

3.1.3. Participants

There were 25 participants obtained via an opportunity sample. Most participants were regular players of some sort of digital game and were between the ages of 18 and 31. There were 15 male and 10 female participants, 8 participants played the colocated condition, 8 played the online condition and 9 the bot. Over 19 of the participants had not played a cooperative version of Tetris before and 18 had not played a competitive version of Tetris. Over half of participants had played some sort of online game before (with friends and or strangers) and 10 out of the 25 classed themselves as a 'Gamer'.

3.1.4. Procedure

After obtaining informed consent, the participant was told they were to work with their cooperative partner (a teammate), to collect as many points as possible within an allotted time frame (5 min) and that there would be chocolate prizes for high scores. There were three experimental conditions under which participants would play the game, the *colocated* condition, the *online* condition and the bot condition. In each condition the participants would play cooperative Tetris with the same teammate (an experimental confederate) who was instructed to play as consistently as possible.

In the colocated condition the participant sat in the same room as their teammate. The players sat beside each other but using separate PCs and viewing the game on separate screens. In other words the participant and their teammate were playing the same game in the same rooms but on their own machines. The online condition physically separated the participant from their teammate, the participant would sit in a room at one computer playing the coop Tertis and were told that their teammate was somewhere else. Their teammate was sat in another room at a computer playing the game. The Bot condition was designed to create a conceptually different experience. The physical setup was much the same as the online condition, with the participant of the experiment playing on their own with a cooperative partner located elsewhere. However, unlike the previous experimental condition, the participant was told that the entity controlling the other blocks was a bot.

After a participant's time was complete they were asked to complete the questionnaire. There was also a brief post-game interview to discuss the experience of playing that discussed the differences between playing a bot and a human, having been told what the experiment was about. This method of multiple measures for gathering user experience is key to the value of a vignette, extracting as many insights as possible from the user experiences in these short studies.

3.1.5. Results and discussion

Each of the five measures (IEQ, three factors of SPGQ and TeamPlay) were compared in each of the three conditions. Summary statistics of the scores are in Table 1. Because of the changes to the SPGQ and the novelty of the TeamPlay score, these scores may not be parametric. However, for consistency sake, all tests are reported using a one-way between subjects ANOVA. The same conclusions were confirmed with the Kruskal Wallis test so these are not reported.

3.1.5.1. Immersion. Immersion scores were very similar across the three conditions. There were no significant differences between the conditions ($F(2,22) = 0.388$, $p = 0.683$). This was not what was expected based on previous experiments in competitive games. Based on the results for individual questions in the IEQ, participants did achieve high attention and enjoyment ratings from participants, and also were consistently immersed that they became unaware that they were using controls. These effects are perhaps unsurprising as Tetris is an incredibly simple (and some might say perfect) puzzle game, which has achieved legendary status and longevity in digital gaming due to its ability to engage players in a single simple task. As expected regarding feelings of separation from the real world and interaction with the game 'environment' received low scores from participants. The results also showed a low average score across all experimental conditions for emotional attachment to the game and interest regarding how the game would progress. Again it is likely that these results reflect the simplicity and familiarity of the game.

3.1.5.2. Social presence. It was expected that the condition with the highest average social presence scores would be the colocated condition, followed by the online condition, with the Bot condition scoring the lowest. As Table 2 shows though the PI-N scale had a very low average (note the minimum possible score across both questions is 2) suggesting that even the two remaining questions left in this scale simply did not apply to a collaborative game.

By contrast, the (partial) PI-E score was noticeably lower in the Bot condition than the other two conditions. This is statistically

Table 1
Summary statistics by condition for immersion (IEQ), the three social presence (SP) factors and TeamPlay (TP).

Condition	IEQ mean (sd)	SP PI-E mean (sd)	SP PI-N mean (sd)	SPBI mean (sd)	TP mean (sd)
Colocated	87.1 (14.6)	10.5 (3.0)	3.3 (2.1)	19.4 (5.6)	35.0 (6.3)
Online	88.9 (9.7)	11.62 (2.0)	2.3 (0.5)	20.5 (2.9)	35.5 (6.3)
Bot	84.3 (7.0)	8.33 (1.4)	2.6 (0.7)	19.2 (4.7)	26.2 (2.8)

significant ($F(2,22) = 4.98$, $p = 0.016$). Interestingly, Tukey HSD follow up tests indicate that the difference is only between the online and bot conditions with colocated unable to be separated from either of the other two conditions. There were no siginficant differences in the (full) BI scale between the conditions ($F(2,22) = 0.192$, $p = 0.826$).

The TeamPlay scores show however that players were differentiating in their perceptions between playing with another person and playing a bot. There was a significant difference between the three conditions ($F(2,22) = 8.41$, $p = 0.002$). Tukey HSD follow up tests show that the difference is that the Bot condition is lower than the other two which are not significantly different from each other.

Thus overall the TeamPlay scores show that players are sensitive to who they think they are playing and attribute more agency to their team mate as well as attempting more to communicate to the team mate. However, the SPGQ did not so accurately pick up these differences. The BI scale did not detect the differences that the TeamPlay questions did despite it being intended to ask about behaviours towards the team mate. The PI-E did detect differences in the online and bot conditions which suggests that players were able to have more em-pathetic involvement with their online team mate than with a bot but that this was not clear when team mates were colocated. Additionally, the PI-N scale seemed to be entirely inappropriate in this context both as a consequence of pilot feedback and the further results in the actual study.

3.1.5.3. Post-game interview. The difference in how the participant's team mate was perceived is perhaps more telling than the scores from the questionnaires. In the post-game interview participants were asked if they felt they were communicating non-verbally while playing, and if they thought they would play differently if playing a bot (or a human if they were in the Bot condition). The responses are shown in Tables 2 and 3.

When asked if they would have played differently if they were playing with a conceptually different team mate (a bot or human), most players said they would play differently, for example *"Bots are stupid, I have never seen a useful bot"*, *"Yes, Bots would have no personality"*, *"I think so, would need more thinking, you cant rely on bots"*, *"yes the game would change"*, etc. The results of these questions suggest that the idea that a participant was playing a bot not only affected actual social presence but also their perception of the interactions taking place and their perceptions of their own playing style despite their being no actual difference in who (or what) the co-player was in this study.

Table 2
Responses to "Did you feel you were communicating non-verbally while playing?"

Condition	Yes	Maybe	No
Colocated	6	1	1
Online	5	2	1
Bot	2	2	5

Table 3
Responses to "Would you play differently if you were playing a bot/human?"

Condition	Yes	Maybe	No
Colocated	4	3	1
Online	5	2	1
Bot	5	3	1

3.1.6. Understanding the vignette

The original intention of the experiment was to reproduce a previous result in the context of collaborative games. However, as is now clear, the SPGQ was simply not suitable for use in this context. The Negative Feelings scale of Psychological Involvement simply does not have relevance reflected both by the confusion of participants in the pilot and the subsequent very low scores on the remaining two questions in the study proper. It is not the case though that players are unaware of their social situation when playing this game as was seen in the difference in the TeamPlay questionnaire (even if that is an unvalidated measure) and in the subsequent interviews where players showed they were attuned to the role of the co-player. This draws into question what the SPGQ is measuring more generally and whilst it clearly has relevance to some games, its scope of applicability needs more carefully defining.

Looking back at how the SPGQ was developed and validated [15], focus groups were used in the initial phase of developing the items of the questionnaire along with the existing NMMSP questionnaire [4,3] as a starting point. The focus group study consisted of 16 participants, half of which were undergraduate students described as infrequent gamers. In the focus group, players were questioned as a group to bring to mind their experiences of playing. An implicit bias in this method is therefore that the types of experiences would be strongly influenced by the types of games that the focus group members play regularly or that they have played recently rather than reflecting the range of games in which social presence (of any sort) might occur. Moreover, focus groups have known problems that require careful management for them to be effective [11,32] so much so that some game designers have a real dislike of focus groups in understanding gaming experiences (see Tobi Saulnier in [27]).

Of course, the SPGQ was then validated in a standard way for questionnaires of this sort through a large scale survey where a wide variety of game genres was represented. This showed that the scales had good internal consistency and that the three scales accounted for 46% of the variance seen in the questionniare which is respectable in any questionnaire validation. Of course, what validation of this sort cannot show is what is missing from the questionnaire in terms of social presence and it is perhaps these factors that we are seeing here. It was this insight from the vignette that inspired the subsequent studies. Like the SPGQ, we have drawn on a variety of sources to probe the nature of social presence in games but differently from the SPGQ development, the vignettes are designed to deliberately draw out different gaming experiences in relation to specific games that we have chosen to probe the

boundaries of the concept. In particular, we realised from this Tetris study that the fact that deceiving people about the online bot was a useful way to see what people really think about social presence and for them to reflect on how it might differ in different situations. This led us to particularly focus on gaming situations where there was ambiguity, either known or unknown, about who people were playing with or against and how that led to different gaming experiences. The vignettes allow for a low cost approach to gaining information about social presence but also to flexibly push at the boundaries of what people mean by social presence in games.

3.2. Vignette 2: forums and survey

The Tetris vignette, like previous studies, highlighted that a person's perception of an entity acting within a virtual environment affects the strength of any social connection to that entity. If an entity is regarded as synthetic or constructed, it is likely that a lower level of social presence will be established with that entity. Simply put, it is the knowledge, not just the presence, of others that is key to social presence.

The drawback of Tetris is of course that it is a somewhat artificial situation using a game that, whilst successful, is not necessarily what people would choose to play regularly, especially multiplayer. To gain more ecological validity in our inquiries into social presence, it was decided to look at real games that are played across the internet. A vignette was designed to gather user generated and farmed data from gaming communities in a quick way to specifically explore the issue of knowing who/what you are playing as this was the key strong finding from the previous study. We therefore gathered data two ways. First, data was collected from forums in results to search terms related to the experiences of playing fake players, that is bots masquerading as human players. Secondly, a particular forum was surveyed about how they would feel to play bots and humans but without knowing which was which.

Such a study need not be a vignette. Other work has taken a principled, multi-method approach to gathering online data e.g. Blythe and Cairns [6], Cairns and Blythe [10] and Pace et al [41]. However, there it was important to ensure a principled approach to gathering the data. Here however, in the spirit of a vignette, we are not attempting to have a rigorous or exhaustive understanding of these issue but merely to bring to light different perspectives that players might have. This is reflected in the vignette design where search terms and forums for the forum part were not extensively tried out and refined and similarly only one forum for a particular game was used in the survey part.

3.2.1. Ambiguity in online games

Across the net first-person shooter (FPS) servers often host games filled with bots masquerading as humans. Normally bots on an FPS server are easily identified: they have generic names and do not have a *ping* score. *Ping* denotes the quality of the player's connection to the server and is used to identify players who may be causing the server to slowdown or *lag*. As bots are located within the server, they have a *ping* score of zero. However in some games, such as *UT* and *Team Fortress 2,* it is possible to modify bots so that they have the traits of a human client on the server such as humanlike names and a *ping* score. Often called 'fake' bots, they are used as tools to make a server seem populated by humans and thus join. Anecdotal evidence from the found data suggests that most players join online FPS servers for the human interaction, otherwise they could simply play the same game but against/with bots. In the various communities of online Gamers this practise is seen as a problem, reducing both fun and trust, and repelling many players from the games altogether. We therefore collected data, totalling around 10,000 words, from gaming forums to find out more about the issue of bots in gaming. This data was analysed using thematic analysis, "a method for identifying, analysing, and reporting patterns (themes) within data" [7,8] and then building on this analysis, deliberately posted questions to a relevant game community forum to elicit players' responses to questions about ambiguity in social presence.

3.2.2. Forum found data

Data was acquired totalling around 8000 words from various gaming community forums by searching Gaming forums for phrases such as 'bots vs. humans', 'fake bots', 'fake clients', etc. This process produced a quantity of useful found data on the topic from the following forums:

- forums.ut-files.com.
- forums.steampowered.com.
- forums.gameservers.com.
- unrealadmin.org/forums.

A review of this data found that in these forums dedicated to games such as *Unreal Tournament* (UT) and *Team Fortress 2,* players state that they feel "cheated", "annoyed" or "tricked" when they enter a server and realise that the players are all 'fake' bots. The practise is frowned upon and described as "dishonest" and a "ridiculous, fake way of getting people".

> "Most people wont play against the bots, especially on an online game since there is no competition really. You're just beating the AI, you can do that off line. Kind of defeats the purpose of online game play."*[sic]* Skillz (forums.ut-files.com).

This sentiment is echoed by Morris [39], who argues that multiplayer FPS games are "co-creative media", the experience of the game not created solely by the developers, but requiring both the developed product and the players. This is similar to the concept of the co-constructed and co-experienced mixed reality applications [53]. This co-creation means 'fake' bots could be considered as a weak or false part of this "co-creative media", reducing the level in which players are willing to invest their time and effort. The general consensus in the communities is that bots are acceptable when they are explicitly identifiable as bots.

> "I don't mind the bots... I dislike the bots being disguised as clients."mig0 (forums.steampowered.com).

3.2.3. Forum survey

Cooperative Tetris showed us that a player's knowledge of the agency of another in-game entity shaped their view of that entity and how they interpreted their actions. But what if players knew there were both bots and humans on a server but just not which entities were which? *King Arthur's Gold* (KAG) is a 2D online multiplayer game in which teams of players build castles and kill each other. The high level system is much the same as an online FPS such as UT, players control their avatars within a virtual environment based on a server, many players can connect at the same time and must compete and collaborate to beat the other team by killing their avatars. The reason this community in particular was chosen was that the KAG project is strongly community driven and had a very active forum used by both the developers and the players. Members of this community were surveyed via the community forum, and asked how they would feel if there was a KAG server in which there were humans and bots but they could not know which were humans and which were not. The response data collected totalled around 2500 words. This survey data was used to establish the overall themes and opinions of the community. Most

players stated that the experience would certainly cause a lower level of immersion and a far lower level of social presence than they normally experience in a KAG server fully populated by humans, or in which the bots are clearly identified as such. However one player (ConmanMC) suggested that immersion is relative to a player's aims, that if one joins a server not to socialize but to simply play in a dynamic environment (for example if one wished to build and repair a building in KAG during a battle), whether the other entities are human controlled or bots is irrelevant. Some players stated that they would probably assume that all the players were bots and a number stated that they would try to identify the bots by testing them in various ways, such as blocking their path or acting strangely and observing their reactions. However most players were confident that they could identify a bot, not only in KAG but in any game, as they assumed bots are always either too bad, too good, or too consistent. Generally each member made it clear that the ambiguity would change the 'feeling' of the game, less of a connection to the other entities and a loss of immersion due to not knowing your actions are affecting other humans. To paraphrase one of the players the game would no longer create the feeling that you are being watched by a 'predator'.

> ''Bots lack empathy [...] whether it be positive empathy [the desire to help you] or negative empathy [schadenfreude], the ability for humans to comprehend + illicit emotions in other humans (even without speech/facial expressions/body language – simply through situational happenings and actions) is something that is so incredibly contextual, subtle, intangible that I doubt it could ever be satisfactorily accounted for with lines of code.''*[sic]* FuzzyBlueBaron (forum.kag2d.com).

3.2.4. Discussion

This study gave an overview of user opinion on the topic of social presence and agency where there is ambiguity about the nature of the co-players of the game. However we acknowledge the limitations of this vignette and do not take the data as truly representative of actual user experience. Instead, the data help to show what users *think* they think, giving us motivation to test these assumptions.

Overall then it seems that players find it very important to know that they are playing other players. Though interestingly they also claim they would always know whether a player was a human or a bot. This would be given away by the in-game signals that would typify a bot player such as very consistent play or strange actions. Nonetheless, most players noted that they would have a lesser gaming experience playing bots and if they were deceived they would feel annoyed or upset as having been cheated from a ''proper'' gaming experience. This in part supports the findings of the Tetris vignette where players also felt that they would play differently if they were playing a bot from if they were playing a human. However, despite the participants in this study feeling confident in knowing which was which, the players in the Tetris study did seem to be genuinely fooled into thinking they were playing a bot when they were playing a human. What may be happening though is that the participants in the KAG server are thinking of KAG in particular and other similar games they commonly play when reporting on their thoughts about the playing experience. In the Tetris study though, players were reflecting on a specific gaming experience but in a game which may not offer the opportunity for more rich and complex actions that would give away fake bots. This concern perhaps reinforces the importance of exploring the space of games when inquiring into the different aspects of the playing experience and that by explicitly having participants reflect on a specific gaming experience, we are better able to probe at their actual experiences.

3.3. Vignette 3: ambiguity in unreal tournament

The survey makes it clear that social presence is important to players and moreover that they feel that they are finely attuned to playing against humans. However, as was seen in the Tetris study, this was not the case. So what would happen if ambiguity were introduced into a collaborative virtual context? Would players really feel less social presence and immersion as the community survey suggested?

This vignette set out to further explore the findings of the community survey by constructing a gaming scenario which contained ambiguous in-game entities, anonymous avatars which other players knew could either be human or computer controlled. The aim of this study was to investigate ambiguity concerning the *realness* of the entities which share the virtual place. The main question that this study aimed to explore was: how does ambiguity affect Social Presence?

Again, because this sort of question simply has not been examined before, we took the vignette approach where a small qualitative study was set up around a group of players actually playing a specific game. As the goal of the study was to better understand the experience of social presence, players were asked to play in groups of four after which they were interviewed as a group about the experience of playing. The four players were made up to eight players by four additional bots and each team comprised two humans and two bots. The bots provided ambiguity in the social situation allowing us to ask concretely about the necessity of real players for social presence. It had been planned to use the SPGQ in this study again to see if specific connections could be made between the SPGQ scores and the qualitative description of the players experiences. However, it was found that players simply found it difficult to fill out any of the SPGQ questions because of the complex mix of co-players and competitors, bots and humans, and what the questions meant in relation to these differing types of player.

3.3.1. Setting up unreal

The game chosen to provide the virtual place for this study was the original *Unreal Tournament* (UT), a tried and tested game on which to base studies. There were a number of potential multiplayer online games which could have been used for this study, such as *King Arthur's Gold* or *Team Fortress 2* and games such as those in the *Worms* series. However UT was chosen for this study due to its simplicity and purity of game style, and the ease with which the game could be set-up for the needs of this study. UT is also extremely easy to configure for the desired experimental conditions. Bots are very simply modified to resemble player avatars by changing their names and appearance. Moreover, bots' playing style can be altered to be careless, aggressive, cautious or avoidant. They can also be configured to jump, strafe or 'camp' and favour particular weapons. The bots are also very well 'mapped' to the various levels of UT, which means they would be able to navigate the virtual environment efficiently and not become stuck or engage in any other obviously non-human activity. In addition to making the identities of the bots ambiguous, UT servers are quick to set up across a local area network and extremely reliable, which ensures an efficient and effective study environment.

To help ensure ambiguity of the bot/human entities the servers were configured using the following details:

- All entities had standardised predefined names.
- All players were instructed not communicate via ingame text.

UT offers a wide variety of 'game modes' in which players can compete and collaborate. In this study two game modes were used, Team Death Match (TDM) and Capture the Flag (CTF). In TDM the

players and bots are split into two teams, the aim of each team is to score a higher number of kills than the other team, each kill made by a member of a team counts towards both their team's score and their own individual score. The game consisted of one 'match' which lasted 10 min. In the CTF game mode the players and bots are again split into two teams, however the aim of this game is for one team to capture the enemy flag from their 'base' on the map, and return it to their own base. In this mode the number of flag captures count and the number of kills is irrelevant, although a tally is kept for ego purposes. The first team to make 5 flag captures wins, in the case of this study, this process took around 15 min.

3.3.2. Participants

Eight participants formed two groups of four. These two groups participated in the study separately. There were a total of six male and two female participant between the ages of 22–28, five of the participants had played this version of UT before, all participants were experienced FPS players.

3.3.3. Procedure

The group was asked to play on a TDM server, the participants were informed that there would be a number of other human players on the server and a number of bots. In this particular study the players were colocated within the same room. The UT server was hosted on a computer used by one of the participants and the other participants joined the server using laptops connected to the host PC via network cables and a switch (LAN party style). They did not have visual access to the displays of the other players. Players and bots were randomly assigned to teams so that each team contained two bots and two players though the players did not know this at the start of play. The two teams of four then competed against each other. The participants were instructed to play the game as normal until the match was over. After the match had finished the group was asked to discuss the experience in a group interview with all participants. Throughout this discussion the players were asked specific questions relating to immersion and social presence, in addition to the ambiguity aspect of this study.

Following this discussion participants were asked to join a new server, this time a CTF match, and were again informed that there would be a number of other human players on the server and a number of bots. After the match had finished the group of participants were again asked to discuss the experience, this time comparing immersion, social presence and the issue of ambiguity in the TDM and CTF game modes. It was hoped that this comparison would help enlighten the interplay between context, ambiguity and social presence.

3.3.4. Unreal experience

UT Deathmatch games take place in a relatively small virtual environment, designed to maximise player contact and provide a fun, challenging, and rapid action experience. In the TDM conducted in this study the participants stated that experience was extremely fun and highly immersive. The action was very quick, with most of the players and bots scoring a high kill count. In fact, in the TDM, a player was just as likely to be killed by a bot as by another human player. Throughout the TDM players did not communicate verbally other than to laugh or groan in despair.

The TDM provided such a chaotic experience that the participants had little time to consider who the players and bots were. Participants stated that in the TDM teammates only represented "people to not shoot", and that they could only identify other human players if a clear mistake was made, i.e. a player shooting at their own team, something a bot is programmed not to do. In this high paced and often "confusing" environment participants expressed a great feeling of 'flow', stating that they were in an almost "mindless" state of enjoyment. In this situation, the participants stated that ambiguity was not important to their perception of the game and they did not care who the bots were as all their enemies and teammates were acting in a similar manner, jumping around and shooting.

The CTF section of this study took place in a larger virtual environment, as is the nature of CTF maps. Participants stated that in this game mode there was a far higher sense of social presence and the game made for a more tense experience. Throughout the game, participants communicated far more regarding tactics. The participants discussed what roles they would take on (attacker/defender), requested help, encouraged their teammates, discussed enemy location and movement, and so on. This verbal communication is interesting as the players reported that while they were talking to their teammates, they were unsure which of the other human players were on their team, but assumed some must have been and so made open statements to the whole room. Players also reported making tactical decisions about what information to communicate to the room.

While the bots present in the CTF game were still technically as 'dangerous' as the ones present in the TDM game (they were as accurate, skilled, etc, as before), the more tactical nature of the CTF environment reduced this threat in the human player's minds. In CTF the goal is far more clear cut, yet winning the game requires more than simply taking less casualties than the opposing team. In this game the participants played far slower, and expressed that they were in a more "tactical state of mind" and felt more like snipers trying to outwit one another. After the CTF the participants stated that the ambiguity made them second guess their choices and act more cautiously than they might if they were playing CTF with only bots.

The tactical nature of CTF led to the ambiguous issue being of far more importance in the CTF than in the TDM. Participants observed one another and often exclaimed "who was that?" when they were killed. The participants stated that, in this game, it was very important to know who the humans were as they were far more likely to be dangerous, both to the player character, and to the team's flag. In this situation, the participants were often able to identify the bots due to their inability to adapt to this tactical environment. Other tell tale signs of bots were non-team focused actions (e.g. running towards the enemy flag alone, not giving 'covering fire'), and a lack of caution while acting in a sniping role.

The participants also reported that in the TDM the ambiguity did not affect immersion, whereas in the CTF the ambiguity detracted from the task at hand, at least in the beginning as the participants realised the human/bot distinction was to be more important in this game. Participants in the second group stated that in the CTF mode the ambiguity became increasingly distracting towards the end of the game as much of their motivation changed from winning the game to identifying the humans.

Participants stated that once they had adequately established to themselves which entities were bots and which were human, their feelings towards the entities changed. Their focus switched to the human players, largely ignoring the bots unless they managed to captured a flag. In one situation a bot captured an enemy flag and was bringing it back to a participant's base. An allied participant stated that they were mostly considering the enemy human players, and focusing on protecting the bot from them. It was also expressed that in the TDM mode it felt as though the teams were made up of individuals working alone, whereas in the CTF game the teams felt like "real teams". Participants expressed that being in a team made the game more immersive, socially stimulating, and generally made them put more effort into winning.

3.3.5. Discussion

Despite the findings of the previous study where players were sure that they would recognise bots and that bots would diminish

the playing experience, this study presents a quite different picture. The importance of player agency is pragmatic and depends on the task at hand. The ambiguity did not affect playing experience and social presence in a situation where the human or synthetic nature of the other in-game entities did not matter to the participants. In the TDM, the aim was to kill as many enemies as possible, in an environment so chaotic that survival depended on concentrating purely on the mechanism of the game. However in a situation in which a human was more dangerous/useful than a bot, participants invested time and effort to observe the other entities to deduce who the humans were. In CTF, the situation was not chaotic, giving players time to consider tactics which hinged on the other humans present in the game.

This sensitivity to the importance of social connection is reflected in the behaviours of the players. In TDM where the agency of the co-players was irrelevant (more or less) to the gaming experience, communication was a minimum of basic emotional state through laughs or groans. However, in CTF, players made overt attempts to communicate with their fellow team mates whilst also trying not to "give the game away" to the other team. They therefore publicly communicated but in careful and strategic ways. Moreover, in the same spirit, players did not overtly respond to these broadcast messages. Players were therefore clearly experiencing social presence, feeling the need to communicate with team members and at the same time avoiding communication with the opposing team. It could also be speculated that the mental formulation of such communications becomes another source of engagement in this particular playing experience.

The study also suggests factors affecting the use of bots in games. Where the game does not depend on strategic and coordinated efforts between players, bots can provide successful gaming experiences. Players may occasionally spot bot-like behaviour but they will not mind it. However, where play requires careful and, what might even be called slow, action, bots lack the apparent deliberation of human players and so stand out. This is perhaps what the players of KAG were bringing to mind when they were thinking about the issues around playing bots. For example, a bot in KAG will run, jump and stab at members of the other team, but they will not stand and defend a narrow tunnel or strategically destroy terrain to indirectly affect the opposing team.

In terms of methodology this UT study justifies the vignette approach. Though very small scale, this vignette has demonstrated that the findings in the survey vignette are not as black and white as they appear. As well as being pragmatic about needing to know whether players are bots or humans, people are also sensitive to behaving differently in front of opponents. This shows that people do not just have a binary division of "me or other player" as suggested by the SPGQ.

3.4. Vignette 4: Puji

The previous vignette involving ambiguity highlighted that the effect of ambiguous agency was highly pragmatic. In a situation in which players were as much at risk from bots as from humans, ambiguity was of no concern. However in more tactical situations ambiguity was of great importance as players carefully observed the behaviour of in-game entities in an attempt to establish the bots and humans. This next study therefore aimed to explore this issue from a different perspective. It was decided to carry out a study in which ambiguity was not an additional factor inserted into the game by us, but was central to the game play. The game chosen for this was *Puji*.

This study aimed to deeply explore the issue of task in relation to social presence by switching the UT vignette experience around. The game of *Puji* inspires the CTF style of play, in that in this game humans are dangerous, while bots are not. However unlike the UT study the ambiguity is not simply an additional factor to the game, but is part of the game play.

Like the previous vignettes, this study was inspired by the studies that have gone before it and was organised and run quickly after the UT study. This vignette uses the same participants as the UT study, and thus could be considered a less formally acceptable user study. However the point of this vignette was to get individual comparisons of user experience.

3.4.1. Materials and setup

Puji[3] is a flash game played using a single keyboard and screen. In this game two (or three) players control a monk in an environment filled with identical monks. In this game the bot controlled monks behave in a set number of ways, standing still or moving along an L shape. *Puji* was played on a laptop with participants sharing the single keyboard and screen. The aim is simple: kill the other player's monk before they kill you. This is done by moving next to the opponent and kicking them. However complexity is introduced as the avatar of each player is not identified at the start of the game. Therefore players of the game must establish which of the identical monks is their avatar without giving away their identity to the other player, while also watching out for signs of the enemy monk. Thus, the game has in-built ambiguity, first, as to a player's avatar in the game and, secondly, as to identifying the other player whilst remaining unidentified. The game is similar to the game *Spy Party,* an asymmetric multiplayer espionage game, and the *Assasin's Creed* multiplayer mode. Puji distils the core concepts of these games in a simplified mechanic, concepts such as ambiguity, theory of mind, and hiding in plain sight by emulating bot behaviour, etc.

3.4.2. Method

Participants were welcomed and briefed about the game and the study. Participants were shown the game, informed of the aims and controls of the game, and how the study would be structured. The participants were then randomly arranged into pairs using a coin toss and asked to play *Puji* before discussing their first impressions of the game mechanics, their tactics, and their experience of the game. After this preliminary discussion another round of play was carried out in which the winning and losing players of the first round played against each other, followed by another discussion of the experience. In summary the structure of the study was as follows:

1. Participants briefed.
2. Participants arranged into pairs.
3. First round of play.
4. Preliminary discussion.
5. Second round of play.
6. Final discussion.

There were eight participants in this study, consisting of six male and two female between the ages of 22–28. All of the participants could be considered highly experienced with games across a number of gaming genres, all participants had played Flash-based games however none had played *Puji* previously. As stated the participants in this study were the same as those in the previous UT study, this was intentional as we wanted to compare the experiences and get the subjective views of the users.

Participants were arranged into random pairs and would play each other in a league system so that everyone would play a total of 2 matches, decided on a *'best of three'* basis. The aim of the multiple play opportunities within the study procedure was to allow the participants to become 'experts' at the game, or at the very least

[3] *Puji* http://www.patkemp.com/wp-gallery/games/puji.html.

become highly familiar with its intricacies. Participants understood the concept and controls of the game extremely quickly and did not state any problem in playing the game.

In this study the participants' actions throughout play were observed and notes were taken, however the primary source of data was the reported accounts by the participants and the discussions which centred around them.

3.4.3. Puji experience

Participants stated that *Puji* was highly immersive, engaged them to a high degree and made them notice their surroundings far less as they focused on finding their opponent. Indeed one participant argued that *Puji* required their entire concentration for them to be successful. As well as being immersive, the participants regarded the game as extremely fun, facilitating high levels of competitiveness and suspense. One of the strongest feelings expressed by the participants was the feeling of being 'hunted', a certain "got to find them before they find me" feeling. Participants stated that this intense feeling came entirely from the explicit presence of another human.

When describing *Puji* the participants stated that the game contained elements from many other gaming genres, combining them in one simple effective environment. Participants drew comparisons to the core elements of more complex Player vs. Player (PvP) games such as *Sniper Elite,* as players aim to remain hidden from their opponents and carefully chose their moment to strike. The way the game is played and the skills required to win made some participants draw close connections to 'Hidden Object' games, in which players must spot certain objects hidden in a scene (much like *Where's Wally?*). However in *Puji* it was not an object but a hidden clue or 'tell' which the participants were looking for.

Participants also drew comparisons to more traditional games such as *Poker,* stating that the game was incredibly easy to learn, but difficult to master. Participants were surprised that such a simple game required such high levels of concentration to avoid slips and mistakes. However, participants acknowledged that it was not simply the mechanics of *Puji* that demanded their concentration, but their opponent which created the game. *Puji* then is a game with few simple rules, providing a simple environment to allow the opposing players to duel and create their own challenge. In many ways, the reliance on the other player to make the game is like many traditional games, such as *Monopoly* or tennis, the difference though is that the digital nature of the game means players are projected into a wholly different game arena where their identities can be hidden in plain sight. Despite the participants recognising the similarity with traditional games, the digital is an essential component of the game.

In this study participants reported that there were several ways in which other players could be identified; watching for incorrect attacks on bot monks, watching for non-bot-like movement of monks or 'tells', and watching the key strokes of the other participant and trying to link their keystrokes to a monk. However the latter proved mostly unhelpful as participants often chose to move at same time and in same direction of bot monks to blend in and 'cover' key strokes. Participants stated that their main tactics for remaining hidden were; staying still, moving with groups of bot monks, and mimicking bot movements. To paraphrase one participant, *Puji* is one of the few games in which doing nothing is doing something. Participants reported that moving in for the kill was difficult as bots "do not move with purpose", one participant stated that they had lost one match because even though they knew that their opponent was approaching them they did not want to "act human".

Overall the participants concluded that most important element of *Puji,* how the game was won of lost, was the successful management of 'tells' (detecting players and avoiding being detected). As one participant stated in *Puji* "bots dont twitch".

Participants were able to articulate well how they felt *Puji* differed from *UT* in terms of social experience. Participants stated that *Puji* felt like more of a pure battle of wits, a contest against someone's consciousness in a very mindful way. One participant stated that in UT, one has the ability to hide, take a moment to plan and gather one's thoughts and even relax, something which is not possible in the short *Puji* matches, as unlike the UT study, participants knew their opponent was always watching. Another participant argued that the biggest difference in how ambiguity affected the experience in UT and *Puji* was the matter of how terminal the consequences were. In UT, especially in a Deathmatch "if someone is or is not a bot is completely irrelevant to the matter at hand as both of your responses will be the same", you shoot them. "The only way in which it factors in is player skill", and while player's tactics will change depending on whether they think an opponent is a bot or a human, their overall aim remains the same, shoot them. "Whereas in Puji figuring out who isn't a bot is the objective", that and not giving one's self away are the only things that matter.

3.4.4. Discussion

Puji created a sort of hyper social presence, not just the general, one could say *passive,* awareness of another human presence, but a constant awareness of being sought by another specific consciousness and in turn actively searching out evidence of that consciousness. Participants stated that sharing a machine (screen and keyboard) did not necessarily increase the feeling of social presence, but did make the game far more tense. It seems that the explicit presence of one's opponent, knowing that they are watching the same screen while one is trying to be 'stealthy', increases the intensity of any tension. This hints towards the concept of 'mere-presence', in which the mere presence of another human within the vicinity will affect one's performance within a virtual environment. While the participants did not perceive the tension as social presence, it is perhaps a sign of social presence, as the tension only exists due to the explicit presence of the other player. In addition to the explicit presence of their opponents, the high levels of social presence and tension felt by the participants may have been due to familiarity participants had with each other. The participants were all friends or aquaintences so it is likely that a sense of playful competition increased their desire to beat each other. One question which arises from this scenario is, what if the participants were playing the game remotely and/or, did not know their opponent as in the Tetris study.

In terms of social, this game takes an issue found throughout virtual environments taken to an extreme, namely, who is the person I am interacting with and what is interaction saying about me? It shows an extreme (though simple) example of social presence in ambiguous environments and highlights that in some circumstances human presence in a virtual environment is essential for creating certain powerful feelings, in this case the feeling of being 'hunted'. While one might feel hunted while playing a well designed single-player computer game, the effect of human presence creates an intangible depth to the experience.

4. Conclusions

The aim of this work was to better understand the role of social presence as a constituent of the overall experience of playing digital games. The initial study, looking at collaborative Tetris, was intended to investigate the nature of the gaming experience in the context of collaborative games rather than previous work that had done very similar studies but for competitive games [20,12].

As such, the study intended to rely on the Social Presence in Gaming Questionnaire but was found, even in piloting, to present problems in this context. Despite being based on the Networked Minds measure which had been developed using a collaborative task [4], one factor of the SPGQ is only about negative feelings towards the other player which was entirely inappropriate in this context, and most likely in many other collaborative gaming contexts. Furthermore, other questions did not seem to be relevant in this context because they required second guessing a co-players mood or feelings which collaborative Tetris was not sufficiently subtle to convey.

This led to the idea of exploring more widely and more extensively the whole notion of social presence in digital games and taking into consideration the differences between collaborative and competitive play and also how important it was to be playing people at all. What stands out throughout the studies is that what people say about social presence, what they think is important about social presence and what they actually feel are three distinct things. The first hints of this are given in the Tetris study where players said that they felt differently towards their co-player if they played an alleged bot, as measured by our TeamPlay questionnaire, despite the fact that in all conditions they played a human. The players were not able to detect whether the co-player was a human or a bot (not surprisingly in the context of this game) so the experience they had was guided by what they were told.

The survey study on a range of games and focusing on *King Arthur's Gold* in particular revealed that players feel very strongly about the importance of playing real people and knowing that who they play are real. Additionally, many felt sure that they would be able to identify bots through the in-game signals, or "tells," and some were sufficiently confident to claim that they could do this in any game. The Tetris study though clearly shows that this may not be so straightforward but it also indicates that another important aspect in asking about such things is the games which players are able to bring to mind. Obviously, the players in the KAG survey had KAG at least present in their minds but if they had never played a collaborative Tetris game may not have thought about the problems of detecting real humans in this context.

The third study also showed the difference between what people say and what they experience. Here, Unreal Tournament was used: a rich, complex game with a lot of opportunity for interaction. Yet, despite this, players did not necessarily find it important to work out who were humans and who were bots, at least not in the Team Death Match games. The chaotic, free structure of those games meant that all that mattered was who was on your team and not their nature. Social presence may have been relevant in knowing that some players were humans and that this was a shared experience but beyond that the details were irrelevant. By contrast, in Capture the Flag (CTF) games, the same players approached the human-nature of players very differently so that they could use the information for strategic thinking in the gameplay. Additionally, the public communication acts of players were highly attuned to social presence, recognising that co-present players could be both team mates and opponents and that these roles were important in formulating what to say out loud.

The *Puji* study brings this into sharp contrast where the whole purpose of the game is to detect the "tells" that say a player is human whilst avoiding giving away such clues. This pushes social presence into a different extreme where it is all about the social situation of needing to be able to see the world from your co-player's perspective. Simple games often focus on a single human skill: pattern recognition *(Bejeweled),* hand eye coordination (bullet hell games), memory, etc. In its simplicity, the game of *Puji* focuses on that uniquely human skill, the theory of mind. It is also almost certain that players would not think of this game when answering generically about social presence in games.

This suggests that formulations of social presence very much depend on the task that people are thinking about when you ask them what is important. This undercuts the foundation of the SPGQ which predominantly asks players about mood, empathy, and action rather than about a sense of shared purpose. This is somewhat surprising as the SPGQ has undergone good validation [15]. However, a closer look at the methodology suggests first that participants in the validation study were self-selecting and secondly that they played the game they felt best reflected playing *against* a social entity. Thus, there is a selection bias in that participants may not have explored the games where there is social presence but that it does not dominate the game play. Additionally, there may be a bias towards consideration of competitive games rather than collaborative games. This may specifically suggest why the PI-N is a dominant factor in the SPGQ but was almost useless in our studies.

Though task is clearly relevant in forming social presence, as seen in the *Unreal Tournament* study, it is notably lacking from the current literature in gaming. A study by Scarpetta [47] is one of the few studies to address task in terms of social presence and calls for the adoption of an action based approach to the phenomenon. The study consisted of multiple players sharing a virtual environment with the aim of collecting treasure. The study found that players displayed and built social presence by communication and performing actions which were directly related to the task at hand. The studies there, as here, found that the task which players perceived they were undertaking affected the feeling of social presence. The agency of the other entities within the virtual environment affected social presence, but the degree to which this concept affected social presence was dependent on the task.

The vignettes as an approach for exploring social presence have been very valuable. They were designed to push the boundaries of the concepts using small quick studies, gathering as much data as possible using qualitative and quantitative methods, and using the findings to view a problem from multiple perspectives. They were intended neither to be rigorous qualitative or quantitative studies but rather to set up situations that might allow for exploring the concept at hand. For example, whilst we did collect extensive forum data in the second vignette, there was no attempt to ensure that this was a highly representative sample of data collected from a wide variety of games and gamers. Rather, the data gathered was enough to indicate something of the character of how people view bots in digital games and the reported importance of bots vs. humans as co-players. It does not need to be more exhaustive in order to gain the insights had here. Unlike a traditional experiment, whilst an experimental manipulation may take place, the vignette is not only concerned with a statistical analysis of the experimental conditions. And unlike a traditional ethnography, the vignette sets up novel situations to push at the boundaries of participants experiences and expectations.

Thus going into a vignette, it is important to acknowledge its limitations upfront. The data will not be exhaustive, or highly representative, but can help to point towards new subjective experiences. Much like conversation analysis, a discipline in which individual studies focus tightly on the language of a particular unique discourse, can reveal much about more general 'orders of conversation' such as turn taking and self repair in speech [26,50], these vignettes study snippets of specific user experience, and combine them to enlighten some wider understanding of social presence as a whole. Thus while we can say that we have gained qualitative insight into social presence in these gaming scenarios, it is clearly not the last word on the matter. The games used in this study were similar enough to allow for a logical progression from one vignette to the next and dissimilar enough to provide a new perspective on the issues addressed while helping to stretch the research in interesting directions. However, as we have stated,

qualitative studies are not about generalizability, and the games used in the vignettes still only consider certain gameplay styles. Nevertheless, together the vignettes form an interesting perspective on social engagement in virtual environments that stands in contrast to existing formulations of social presence particularly in the context of games. They highlight that there is still no well defined theory of social presence that applies in the generic gaming context, despite the claims made for the SPGQ. We cannot be certain about what core elements (such as awareness, agency, environment, communication medium, etc.) make up the feeling, and it may be that the importance of any such concept will be entirely pragmatic. It may even be that the terms presence and social presence are already over-generalised as useful concepts in games.

Of course there is a large difference between real gaming and gaming in experimental conditions, for example joining a regularly visited *Team Fortress 2* server versus being asked by a psychologist to play a human/bot at virtual rock, paper, scissors. In many of the gaming studies whether cited or reported here, the players did not play the game because they wanted to compete, cooperate, and communicate with humans. And yet the perception of human presence (or lack thereof) within the virtual place still changed the experience of the participants. Because the players joining 'real' online servers are specifically looking for human contact, the negative impact on player experience is likely to be even more intense than in the experiments, a conjecture supported by the venom in the quotes found on the community forums.

It could of course be argued that existing conceptualisations of social presence are sufficient to make progress in understanding many current play experiences. However, as is seen with attempts at defining game categories, many games either accidentally or intentionally push the boundaries of existing categories in order to provide wholly new games. For instance *Shadow of the Colossus* is an action-adventure game but with only boss battles. Games do not just defy categorisation: they are being designed to defy categorisation. The presence of other players is also being explored as important game constituents from the explicit requirement for multiple players with diverse skillset like in *World of Warcraft* to more nuanced games like *Journey* where the presence of other players is unnecessary and somewhat ethereal due to limited communication channels but nonetheless important. We would argue that a useful concept of social presence would be one that does not require constant revision in order to keep up to date with innovations in games but should be able to provide a robust description of player experiences in almost all situations. This paper makes a start in revealing what some of the issues with the current conceptualisation may be and through the use of experiential vignettes to explore the richness of the concept, we think that this concept could be put on a much firmer, more enduring foundation.

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