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The effects of winning and losing on social presence in team-based digital games

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ABSTRACT

Social play is an increasingly important constituent of the digital game experience. Though there is a growing understanding of how the social context influences the experience of playing, there is little known about how the experience of play influences the social experience. Specifically, it is not even known whether winning or losing affects a player's sense of social presence with their co-players. This paper provides the results of two studies aiming to explore this interaction. The first study is a lab-based study that looked at whether social presence varied in collocated teams playing team-based games depending on whether they won or lost. The second study is a user experience survey which measured how variables in the context of gameplay affected social presence across a number of team-based online games. The results of both studies show that when teams lose, the negative impact on social presence is greater within teams than between the competing teams. This has implications for how studies in this area should be analysed and also, through consideration of individual games, suggests that mechanisms in the games may lead to the reduced social presence.

1. Introduction

Playing socially is now, and arguably always has been (Selnow, 1984), an important component of playing digital games. Massively multiplayer online role-playing games (MMORPG) have been the flagship of social digital games for some years now, epitomised by *World of Warcraft*. While such games are still played in large numbers, many other games have an important social component. Even games such as the *Call of Duty* series, which were originally designed for single players, are now dominated by the multiplayer gameplay. Multiplayer Online Battle Arena (MOBA) games, like *League of Legends* and *Dota 2*, are being played by literally millions of players in any one day (Gaudiosi, 2011), albeit grouped into small teams.

In some ways, the numbers of people playing socially should not be so surprising. It has been identified as an important component of why people play games in the first place (Sherry et al., 2006). Furthermore, social play fulfils a more wide-reaching human need to feel related to one another (Ryan, Scott Rigby, & Przybylski, 2006). Modern gaming networks offer the opportunity for relatedness in ways that were previously not possible. However, despite the prevalence of playing socially, how the social aspect of play interacts with the experience of playing is not wholly understood. Evidence is accumulating that playing socially is more enjoyable (Gajadhar, deKort, & IJsselsteijn, 2008) and this might be because the experience of playing socially is more immersive than playing alone (Cairns, Cox, Day, Martin, & Perryman, 2013). Further, whilst it does matter if players are playing with friends or strangers (Gajadhar et al., 2008), it does not matter so much if the co-players are collocated or remote from each other (Cairns et al., 2013).

While existing research has focused a lot on the social context of play, it has not looked to the interaction between the game itself and the social experience of the players. This is a potential problem for online games developers as it may be that the games themselves can interfere with the social experience. Jeff Lin of Riot Games has shown that changes to aspects of the game can in fact influence the social behaviour of the players (Lin, 2013). Can it also affect their social experience and hence the overall experience of playing the game?

Additionally, regardless of the design of any particular game, it may be that the act of play itself is able to influence social experiences. Specifically, MOBAs are team-based games in which the goal is to win against an opposing team. Failure is of course a normal part of digital games (Juul, 2013) and can even be part of the fun

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(Matias Kivikangas & Ravaja, 2013). However, what happens when the failure happens publicly as part of a team rather than privately to individual players or friends playing at home? In the domains of online education (Rockinson-Szapkiw, 2009) and organizational studies (Altschuller & Benbunan-Fich, 2010; Nash, Edwards, Thompson, & Barfield, 2000) research has suggested some correlation between performance and social experience. In digital games though, it may be that losing has no effect on the social experience, after all, losing a game as a team has a degree of team responsibility and therefore could still be a full playing experience. Alternatively, it may reduce the feeling of team cohesion and hence reduce the sense of social connection that players seek. Conversely, winning a game may enhance the social experience and thus be a way to greatly enhance the value of the social play. Framed this way, playing socially in a public team could be a form of gamble with the social experience, where the winners take more away from the experience than the losers. Currently, very little is known about this aspect of social gameplay. Furthermore, current studies generally ignore this aspect, for example (Emmerich & Masuch, 2013), which may have consequences for the interpretation of the results of such studies.

Social presence is the term commonly used to understand social connections through media such as digital games but also including virtual environments, online communication such as Skype and so on. Within digital games, one particular measure, the Social Presence in Gaming Questionnaire (SPGQ) has been widely used (de Kort, IJsselsteijn, & Poels, 2007) as a validated measure of social presence. However, while it does seem appropriate for games where players are one-on-one, it does not fit so well with the more complex social situation of team vs team play (Hudson & Cairns, 2014b) even where there are still only two human players involved (Järvelä, Matias Kivikangas, Kätsyri, & Ravaja, 2013). In this work, a newer, more specific scale was used that makes the distinction between the competitive social presence between opponents and the cooperative social presence within teams (Hudson & Cairns, 2014a).

The goal then of this paper is to clarify the role of winning and losing on the social presence between players. The focus is on team vs team games because they provide the opportunity for complex social experiences that are valued by players. In addition, despite the dominance of this sort of social play in digital games, it has not been extensively studied in terms of social presence.

We report on two studies. The first study took an experimental approach to give strong control of the playing situation and so allow for a clear identification of the effect of winning and losing on the different aspects of social presence. This provided evidence that losing did not influence competitive social presence but it did reduce cooperative social presence. However, there are challenges in getting two teams, even small teams, together for a laboratory-style study and this limited the ability to produce a substantial dataset. Further, there is a wide variety of team vs team games any such study is necessarily limited in how many games can be addressed. Where the goal is to make the first in-roads to exploring the effect of winning and losing on social presence, a more wide-reaching methodology was required.

The second study was therefore a user experience survey which measured how variables in the context of gameplay affected social presence across a number of team-based online games. The survey data consists of 821 respondents from across 8 gaming communities, gathered via community forums. Again it was found that winning did provide an increased sense of cooperative social presence, that is, the social presence felt within a player's own team. There were differences in social presence with regards to the competition but they were much less marked. The breadth of the survey data also made it possible to examine differences in presence experienced in individual games. For some games, there was a great deal of difference in cooperative social presence between winning and losing teams. It may be that in these games, the gameplay itself provokes this effect so that when players lose in these games there is a strong disconnect from their team. Where social presence is severely impaired by losing, there may be implications for the bad behaviour (trolling, team switching) in losing teams.

Thus, these studies suggest that where team vs team games are played online, the impact on social presence due to losing is more detrimental within teams than between teams and moreover that some games seem to exaggerate the impact of losing. Moreover in the competitive situation, it may not always appropriate to treat dyads of players or dyads of teams as the best way to analyse social experiences. As this is the first exploration of these in-game outcomes on social presence, it does suggest some important avenues for further research particularly for game developers who wish to promote good social experiences and good social behaviour in their online games.

2. Social presence in games

2.1. Measuring social presence in games

Social presence is a type of presence felt in virtual environments and is distinct from the more widely discussed concept of general (spatial) presence. While presence is defined simply as a psychological sense of 'being there' (Usoh, Alberto, & Slater, 1996) in a virtual environment, social presence is the sense of "being together with another" (Biocca, Harms, & Burgoon, 2003). Social presence is the social connection one makes with entities within a virtual environment, and the level of social presence one feels depends upon the strength of these connections. Schouten (Schouten, 2014) states that in digital games "social presence is the result of being in a social setting. The more opportunities for social interaction the setting has, the higher the degree of social presence will be". Schroeder (Schroeder, 2002) argues that mutual awareness, common focus of attention, and collaborative task performance, are all important elements of social presence in shared virtual environments. Social presence is a core concept in the experience of team-based online games, with previous studies suggesting that in addition to competitiveness and challenge, social reasons such as the possibility of cooperation and communication are strong motivators for people to play team-based online games (Frostling-Henningsson, 2009; Jansz & Tanis, 2007).

Social presence can be experienced to varying definable levels, from a low level perception of other social entities, to a deeper sense of psychological involvement, and finally a strong feeling of behavioural engagement and mutual co-presence (Biocca, Harms, & Gregg, 2001; Biocca & Harms, 2002). As such, it makes sense that social presence can be in some sense quantified through suitable measurement scales. However, though social presence is acknowledged as important to digital games, it is not often explicitly measured.

The SPGQ is one established questionnaire that has been used to measure social presence in games (de Kort et al., 2007). However, it does appear to have been primarily designed for use with competitive games. It includes items which refer to 'revenge' and 'schadenfreude', which are not expected components of social presence in cooperative games. In the SPGQ there is also no distinction between who the other players are in relation to the respondent. This is easily remedied if the respondent is playing one other person who is an opponent in the game, but it is difficult to make the SPGQ suitable for team-based games. In this situation, when there are both opponents and team-mates sharing the virtual

environment the SPGQ items would either have to be doubled up, asking about both opponents and team-mates, or generalized to refer to 'others'. Neither of these solutions are favourable, doubling up significantly increases the length of the questionnaire and thus increasing the likelihood that participants would become bored and fail to complete the questionnaire accurately (Cairns and Cox, 2008). Generalizing the questions on the other hand would create answers which would not clearly refer to any other entity, providing results that would at best be hard to interpret, and at worst so generic as to be meaningless.

In addition, it does seem that there are distinct types of social presence in team-based (Hudson & Cairns, 2014a, 2014b). Competitive social presence is the social connection felt towards one's opponents in a game, while cooperative social presence is the social connection one feels with one's team-mates. For this reason, the work here uses a relatively new, but validated, questionnaire, the Competitive and Cooperative Presence in Gaming questionnaire (CCPIG, pronounced sea-pig) to capture the distinct types of social presence that the SPGQ is not suitable to capture in team-based games (Hudson & Cairns, 2014a).

The version of the CCPIG questionnaire used in this study is a 39 item questionnaire made up of two main Sections: Section 1 for measuring Competitive social presence felt towards opponents and Section 2 for measuring Cooperative social presence felt towards team-mates. Each section has two separate Modules:

- Section 1 Competitive Social Presence (14 items)
  - *Module 1.1: Awareness* measures how aware the respondent was of their opponent and to what extent their Theory of Mind was at play, that is thinking about what the opponents were thinking (6 items).
  - *Module 1.2: Engagement* measures how challenging and engaging the respondent felt their opponents were (8 items).
- Section 2: Cooperative Social Presence (25 items)
  - *Module 2.1: Cohesion* measures a how cohesive and effective the respondent felt their team was (14 items).
  - *Module 2.2: Involvement* measures how involved and invested a respondent felt they were in their team (11 items).

Understandably, the Modules within each Section correlate to some extent with each other so that each Section can be considered as a single measure of Competitive or Cooperative social presence. Further, though, the Modules are distinct components within each section and so aid in the interpretation of which aspects of social presence are most influenced in different situations. The CCPIG can be found at sites.google.com/site/ccpigq.

2.2. Cooperative and competitive social presence

Social play has long been recognised as an important constituent of social play (Poels, deKort, & Ijsselsteijn, 2007; Sherry et al., 2006) but more recently, as social play has become more prevalent and more complex online, the influence of social play on specific player experiences has come to the fore. Vella et al. (Vella, Johnson, & Hides, 2015) showed that social play was able to bring about well-being but they further showed that the feeling of relatedness was higher in cooperative play than competitive play. They attributed this to competitive play requiring conflict rather than mutual engagement though their data was not such as to be able to investigate this further.

Others have therefore turned to explicitly manipulating the social context of games. Järvelä, Kivikangas and others (Järvelä et al., 2013; Matias Kivikangas, KtsyriJrvel, & Ravaja, 2014) used a turn-based strategy game, *Hedgewars*, to manipulate not only whether pairs of players played cooperatively or competitively but the degree to which they were represented as a single team or separate players and also whether they had further AI confederates or opponents. They used physiological measures as well as the SPGQ for social presence and found that in all conditions, pair of players have a degree of physiological linkage suggesting that they are sharing the gaming experience even though it is turn-based. However, there was no measured difference in social presence between the different social conditions. This may be because of features of the game used, features of the game configuration (pairs of players were always or collocated) or possibly even because the SPGQ was not adaptable enough to reflect the variety of differing social roles.

Emmerich and Masuch (Emmerich & Masuch, 2013) also looked at manipulating the social dimension of play around a specially written game, *Loadstone*. In this game, pairs of players (dyads) could play either cooperatively or competitively though, unlike *Hedgewars*, in cooperative mode there were no AI opponents so the gameplay had quite a different emphasis. In this case, the SPGQ did reveal differences in social presence with empathy higher in the cooperative mode and negative feelings higher in the competitive mode as might be expected. However, there is no discussion of whether winning or losing a level influenced the degree of social presence. In fact, to avoid correlations within the dyads skewing results (as suggested is likely with Järvelä et al.'s work (Järvelä et al., 2013)), the social presence scores of the pairs of players were averaged to produce the dyad as the unit of analysis.

In both of the above described studies, there is the possibility that winning and losing is experienced differently and by aggregating across dyads there is a risk of cancelling out effects on social presence. As such, existing studies, do not reveal the possible interactions between social presence, competitive or collaborative play, and game outcomes. Further, while SPGQ is able to distinguish competitive and collaborative dyadic play when play involves only two players, there are suggestions that for more complex social contexts (even if only with AI "players"), it is not able to reveal differences in the social situation.

2.3. Performance & social presence

In the field of management and organizational studies the interaction between social presence and performance has been explored in terms of virtual teams. In a questionnaire based study, Salln'as (Sallnäs, 2004) found both conceptual and statistical overlap between items in questionnaires which aimed to measure performance and social presence, Other studies have also found evidence to suggest a strong link between the two concepts (Altschuller & Benbunan-Fich, 2010; Nash et al., 2000). Another field of research in which social presence has been explored in relation to performance is online education. Within this field of research social presence is defined in a similar way to in virtual reality, as a "feeling intimacy or togetherness in terms of sharing time and place" (Shin, 2002). In a review of the distance learning literature, Rockinson-Szapkiw (Rockinson-Szapkiw, 2009) states that social presence is "central to the success of online education", is "essential to the establishment of a community of learners" (Randy Garrison, 2007), and is highly correlated with perceived learning, deep learning, and learning outcomes" (Picciano, 2002; Randy Garrison & Kanuka, 2004). In a study by (Picciano, 2002) it was found that while social presence did not have a statistically significant relationship to performance in examination scenarios, it did have a positive relationship with performance in a written assignment. Picciano (Picciano, 2002) concluded that there is some interaction between social presence and performance in online education when the learning outcomes are an expressive activity, but not when the outcome is an asocial impersonal activity such as

an exam.

While it is generally accepted that elements of social presence, such as good communication, can lead to victory in team-based online games such as *Counter Strike: Global Offensive* (*CS:GO*) (Juul, 2011), the specific interaction between social presence and game outcome in team-based games has yet to be studied in detail. While not measuring social presence specifically, Kivikangas and Ravaja (Matias Kivikangas & Ravaja, 2013) found that players of a first person shooter (FPS) game experienced increased positive emotion and arousal, in addition to decreased negative emotion, when their character was killed or wounded, suggesting that failure states in games can actually elicit positive responses from players. Kivikangas and Ravaja also measured emotional reactions to game outcome of a competitive game using physiological monitoring. The study found that participants showed more positive responses to victory, however also found participants showed positive emotion in defeat and negative emotions when defeating a friend.

Johnson et al (Johnson, Nacke, & Wyeth, 2015) found that MOBA players placed a high value on competition and sense of achievement they gained through winning. They went on to argue (Johnson et al., 2015) that this, combined with their view that MOBA games are "less focus[ed] on the immersive qualities of the game and greater focus on competing and cooperating with others, [mean that] there is more potential for frustration with the performance of others". Pobiedina et al.'s work (Pobiedina, Neidhardt, Calatrava Moreno, Grad-Gyenge, & Werthner, 2013a, b) found that teams made up of friends were statistically more likely to win in Dota 2. However in a paper which shares data with this study, (Hudson, Cairns, & Imran Nordin, 2015) found that there was little evidence to suggest the level of familiarity between team-mates consistently affected performance.

2.4. Summary

Overall then, social presence is a recognised core component of the experience offered by digital games and that there are important differences between cooperative and competitive playing situations. However, it is not known how the gameplay itself can interact with the social experience. In particular, it is not even known whether winning or losing a game has a meaningful influence on the experience of social presence. Evidence from other fields suggests social presence is linked to performance in certain contexts but it is unclear how this might transfer to the domain of digital games.

3. Study 1

The aim of this first study is to investigate how game outcome affects the social presence felt by participants in two team-based games. The study also looks at two different genres to help further explore the interactions between game outcome and social presence. The games used in this study were *DOTA*, a game in the MOBA genre, and *War Craft 3* (War3), a real-time strategy (RTS) game. These two games were chosen as they represent two games with different game-play elements, but which are aesthetically very similar. In this way the study could explore the interaction between outcome and social presence in two different game genres, while controlling for aesthetics which may affect user experience (Ivory & Kalyanaraman, 2007). *DOTA* is a modification (mod) of *War Craft 3*, meaning that it contains many of the same assets of *War Craft 3* while changing the game-play, and thus the genre of the game. *War Craft 3* is an RTS and therefore requires players to control groups of soldiers, while building a base, and managing an economy so that more soldiers can be produced. In *DOTA* the players control a single character and fight against other players and enemy non-player characters (NPCs) known as creeps.

3.1. Method

As this was an initial exploration of the interaction between game outcome and social presence, the study was conducted as a lab-based experiment so that the variables could be more readily controlled. Each participant played the games on their own laptop and the games were played through a LAN (Local Area Network). Eighteen participants aged from 22 from 26 were recruited from the University of York, sixteen were male and two were female. To control for potential expertise issues, during recruitment it was ensured that all of the participants were familiar with both games used in the study. Participants were divided into three groups with six members and then split into two opposing teams. The groups played two matches against each other using both games and the two teams within each group were located in separate rooms while playing. Following the matches the participants filled out the CCPIG questionnaire and whether they were on a winning or losing team was recorded.

The whole experiment included 6 matches in total. The 6 teams are tagged as below:

Team 1 vs. Team 2, order: match 1 - *DOTA*, match 2 - *War Craft 3*
Team 3 vs. Team 4, order: match 3 - *War Craft 3*, match 4 - *DOTA*
Team 5 vs. Team 6, order: match 5 - *DOTA*, match 6 - *War Craft 3*

Following each match the participants completed a questionnaire and a de-brief interview was conducted.

3.2. Analysis approach

The data from the CCPIG was normally distributed and so the analysis was conducted parametrically. This also allowed for examination of effect sizes using partial eta-squared η_p^2 that arises from Analysis of Variance (ANOVA). However, because the number of participants was relatively small, over-testing has been avoided by only considering the two main components of the CCPIG competitive and cooperative social presence.

Furthermore, the true independent variable in the study was the game that was being played. The game outcome, whether players won or lost, was only a pseudo-independent variable being determined by the gameplay. However in this study there were only winning teams or losing teams, if a team won, it won in both games that it played and similarly if it lost. This means, winning or losing could be treated as a between participants variable in the analysis and therefore makes the data amenable to analysis using mixed measures ANOVA.

3.3. Results

The two dependent variables in this study were the competitive and cooperative social presence scores of the participants. It should be noted that these correlated reasonably strongly. Overall the Pearson correlation between competitive and cooperative social presence was $r = 0.51$, $p = 0.002$ with the correlation when only considering DOTA being even smaller, $r = 0.37$ but comparable to Warcraft 3, $r = 0.50$.

The means and standard deviations for competitive social presence are summarised in Table 1 with the data also represented as a boxplot in Fig. 1.

The results show the mean levels of competitive social presence were broadly similar, there was no main effect for game outcome though $F(1, 16) = 0.298, p = 0.593, \eta_p^2 = 0.02$ and no interaction effect either, $F(1, 30) = 0.163, p = 0.692, \eta_p^2 = 0.01$, though there

Table 1
Mean (sd) for competitive social presence in all conditions.

	DOTA	War3
Lose	52.2 (8.25)	47.6 (9.04)
Win	51.0 (5.07)	44.6 (13.46)

levels of competitive social presence were similar. Previous work has shown that competitive social presence can be manipulated by the context of the game (Cairns et al., 2013) but here the players were not affected by the game outcome. This suggests that win or lose, players are equally aware of the competition offered by the

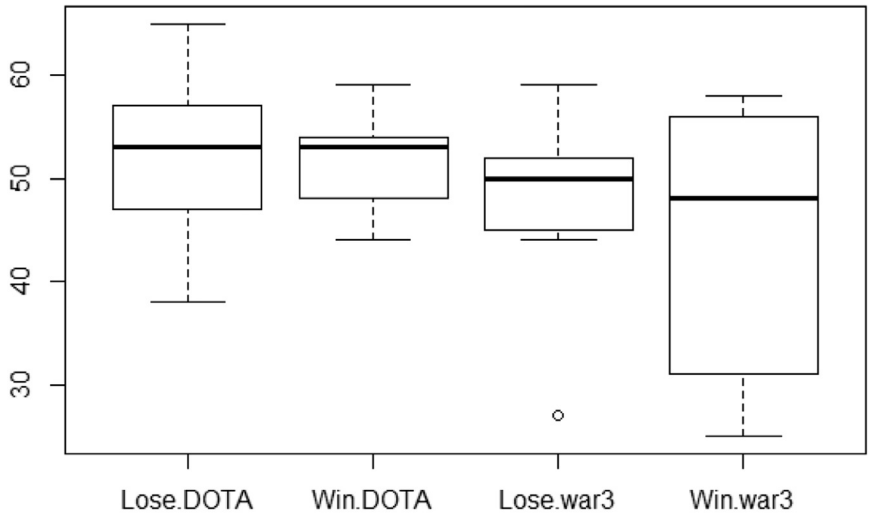

Fig. 1. Boxplot showing the effect of winning and losing on competitive social presence in Dota and War Craft 3.

was a main effect for which game was played $F(1,16) = 6.35, p = 0.023, \eta_p^2 = 0.28$.

The means and standard deviations for cooperative social presence are summarised in Table 2 with the data also represented as a boxplot in Fig. 2.

The ANOVA shows a main effect of game outcome, $F(1,16) = 8.04, p = 0.012, \eta_p^2 = 0.33$ as well as the main effect due to which game was played, $F(1,16) = 7.80, p = 0.013, \eta_p^2 = 0.33$ but no interaction effect, $F(1,30) = 1.77, p = 0.202, \eta_p^2 = 0.1$.

3.4. Discussion

The results show that although there was a degree of correlation between competitive and cooperative social presence in digital games, there are distinct differences between how the two measures function in relation to winning or losing. Cooperative social presence was substantially affected by winning or losing but competitive social presence was hardly affected at all. Interestingly, the game played had an effect on both competitive and cooperative social presence with players experiencing a greater degree of both in *Dota*, with quite an appreciable effect.

Of course, winning or losing was only a pseudo-independent variable here and so it is important not to interpret these findings causally, that the winning or losing caused the differences in social presence seen. In particular, because each team either won or lost, it may in fact be that the lack of cooperative social presence within a team led to it losing rather than the other way round. However, it is worth nothing though that regardless of winning or losing, the opposing team and moreover that players are able to isolate the social presence felt towards competitors from the outcome of the competition.

The different play styles of *DOTA* and *Warcraft 3* seemed to play out in the experience of social presence in this study. This suggests that there are important elements of the games themselves that are able to influence how players relate both to their own team and to the opposing team. In this case the RTS game offered less social presence than the more action oriented MOBA game. This could be a useful consideration for game designers in building up a picture of the gaming experience they wish to offer players.

Though this experiment has revealed meaningful connections between game outcome and social presence, there are problems in conducting this style of study. First, it was quite difficult to recruit sets of 6 people with the appropriate background experience to come together to play the games. This has resulted in using only a small sample of players and an even smaller sample of teams. Secondly, to gather players for a range of games would require not only considerably more effort but also considerably more good fortune in having a substantial, local player-base for several potentially relevant games that we might study. Thus, though this study has indicated substantial effects, we moved towards a different style of study in order to purposively sample more players on more games.

Table 2
Mean (sd) for cooperative social presence in all conditions.

	DOTA	War3
Lose	94.9 (12.92)	81.1 (17.07)
Win	105.6 (11.72)	100.7 (10.78)

4. Study 2

The aim of Study 2 is the same as that of Study 1 to investigate how game outcome would affect the social presence felt by participants in team-based games but to achieve this across a much more substantial dataset and from a wider range of games. Study 2 therefore was an online survey based primarily on the CCPIG but with further contextual game-play and demographic information. The survey was deliberately targeted at players of particular games through posts to game-specific online forums.

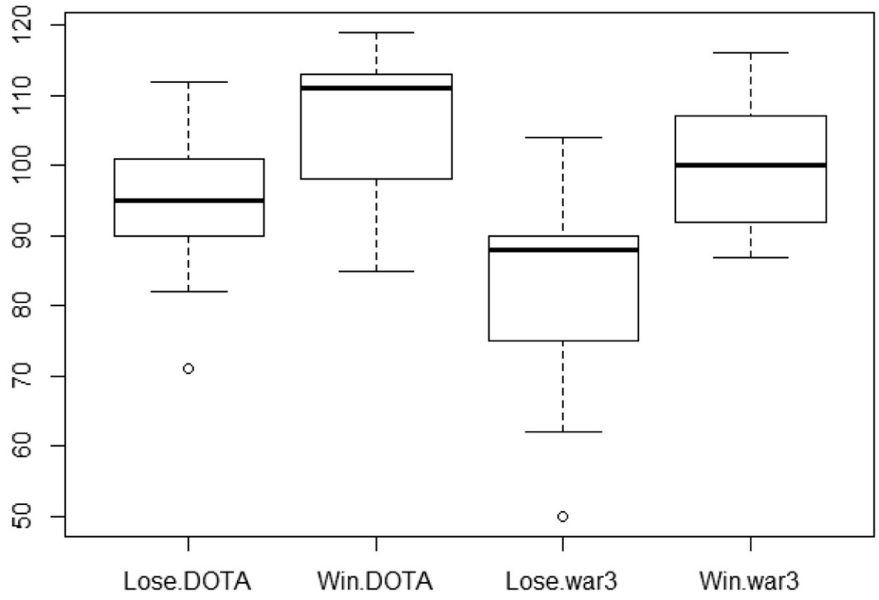

Fig. 2. Boxplot showing the effect of winning and losing on cooperative social presence in Dota and War Craft 3.

Based on Study 1, it was expected that there would be some interaction between social presence and game outcome, specifically that:

1. respondents on winning teams would show higher cooperative social presence than those on a losing team
2. competitive social presence of respondents would be largely unaffected by game outcome.

4.1. Procedure

The data in this study was gathered using a community survey methodology, in which a call for participants to take part in an online survey was posted on a gaming community forum. The benefits of conducting online surveys include, savings in time and money, the potential of high respondent numbers, and most importantly, access to unique populations (Murthy, 2008; Van Selm and Jankowski, 2006; Wright, 2005). In terms of digital games research this is particularly true, with huge numbers of niche communities built around specific games or genres of games. Of course online surveys have their downsides, with sampling issues, and the risks inherent to the internet, such as invalid/false data, and potentially hostile responses from communities if not engaged with proper care (Andrews, Nonnecke, & Preece, 2003; Hudson & Bruckman, 2004; Wright, 2005). However, the downsides of online surveys in general are far outweighed by their benefit of gaining large, ecologically valid datasets (Murthy, 2008; Van Selm and Jankowski, 2006; Wright, 2005), with one of the most notable examples in gaming being the Daedalus Project (Yee, 2003).

In this study, the community survey was initiated by posting a call for participants on a gaming community forum, after permission was sought from community moderators/admins. This call for participants asked for volunteers to fill in an online version of the CCPIG after playing a game for a normal gaming session. Respondents had the option to enter a prize draw to win a digital game (worth £20). Social presence was measured using the CCPIG questionnaire and game outcome was established using simple explicit questions, asking respondents if their team won or lost. The questionnaire was closed after seven days. In addition to the CCPIG respondents were asked standard demographic questions such as age and sex, and were able to fill out an open comment section which many used to give their opinions on the nature of their game, community, and gameplay experience.

The game communities chosen for this study were *Mount & Blade (Warband)*, *War Thunder* (Arcade mode), *Dota 2*, *Chivalry: Medieval Warfare*, *Arma (3)*, *Natural Selection 2*, *CS:GO*, and the *29th I.D.* clan (*Darkest Hour: Europe '44–'45*). These communities all revolve around games which differ in graphical fidelity, theme, and style, but all share the core element of being team-based online games, featuring competitive and cooperative gameplay. While some of these communities such as *Arma* and *Mount & Blade* are based around a series of games, in this study these terms refer to the specific game noted above. For example the *Mount & Blade* community produced 239 respondents, this means 239 datum are based on *Mount & Blade: Warband* gaming sessions, but for succinctness the community is referred to. The average number of responses gained from a forum corresponded to 1 respondent per 7.7 views (ranging from 1 in 5 to 1 in 10 for the different forums).

For the sake of brevity, in this paper the overall results are reported together with the results from games with the top three participant numbers, *Mount & Blade*, *War Thunder* and *Dota 2*. *Dota 2* (*henceforth simply Dota*) is a multiplayer online battle arena (MOBA). In *Dota* two teams of five players select 'Hero' characters, and work together the destroy their opponent's base. *Dota* has both player versus player (PvP) and player versus environment (PvE) elements, with computer controlled towers and units ('creeps'), which populate the three paths ('lanes') which lead from one team base to the other. *Dota 2* is free to play (f2p) and like most RTS games *Dota* is played from a top-down perspective.

Mount & Blade is a medieval themed team-based combat game and has game modes which include castle sieges and pitched battles for up to 250 players. *Mount & Blade* is predominantly played in a third person perspective, but first person perspective is used for ranged based weapons. Players can chose from three main character classes (Archer, Cavalry, and Infantry) and can select various weaponry and armour.

War Thunder is an aircraft based team-based combat game usually with teams of up to 16 players. Players can chose planes from pre-World War II to Korean War time periods. *War Thunder*

has three different gameplay types, Arcade, Realism, and Simulation. Arcade mode is a simplified and accessible air combat experience, the player's plane can be viewed from a third person perspective and there is various Heads-Up Display (HUD) information to aid players in combat. Realism mode has more realistic physics, damage and control mechanics, ammunition must be reloaded at airfields, and there are less HUD aids for players. Simulator mode is a the next step from Realism mode. It limits players to first person (cockpit) view of the world, contains realistic physics, requires a joystick, and essentially presents its self as a combat flight simulator. Arcade was chosen for this study as this game is free to play, and Arcade most is the most accessible mode, it was assumed that there would be a large player base in Arcade mode.

4.2. Participants

The study gained a total of 821 respondents, of these respondents 543 stated that their team had won the game, 190 stated their team had lost. The remaining respondents stated that their team drew, gave a non-committal answers, or stated their response was bases on multiple rounds which were won/lost in equal measure. Table 3 shows the number of respondents from each community forum including the number of respondents in winning and losing teams.

4.3. Statistical approach

The investigation of the interaction between game outcome and social presence was achieved by exploring the statistical significance and effect size of differences between variables (winning and losing). As the data set was quite large and varied the effect sizes of any differences are considered as a counterpoint to significance: significance is likely to appear from small differences in large data sets (McCluskey and Lalkhen, 2007) so we have focused therefore more on effect sizes to allow us to determine the practical significance of the results. The statistical significance of winning and losing on social presence was measured with a two-tailed t-test, with a $p < 0.05$ being considered significant. To measure effect size Cohen's d was used, with a score of 0.3–0.5 considered as a small effect size, 0.5–0.8 as medium, and 0.8 or more considered a large effect size (Cohen, 1992).

It would have been desirable to have explored the differences in each individual game but as seen in Table 3, there was an imbalance in numbers of players who reported losing the game. This meant that in the five games that received lower numbers of respondents, there were less than 20 reporting losing. We have included the respondents from these games in the overall analysis as they constitute a substantial proportion of the overall dataset, around 300 of the 821 respondents, and provide the breadth in games that we were seeking in this study. However, we have not considered these games individually in relation to game outcome because of the low number of losing respondents. The game-by-game analysis is therefore restricted to the top three games in terms of respondents. Even with these three games, there is sufficient variety to begin to examine the influence of different play contexts on social presence.

Table 3
Respondent numbers across the various games and Win/Loss conditions.

Community forum	Respondents	Win/Loss	Win	Loss
Mount & Blade	238	201	154	47
War Thunder	169	156	101	55
Dota 2	91	88	53	35
Chivalry	78	70	59	11
Natural Selection 2	78	65	50	15
Arma	77	70	58	12
CS:GO	47	41	33	8
29th ID	43	42	35	7
Total	821	733	543	190

5. Results

5.1. Overall data-set

The expectation based on Study 1 was that a team victory would correspond with higher cooperative social presence than a defeat, but would have little interaction with competitive social presence. Table 4 shows that game outcome appears to have had a significant interaction with the reported level of cooperative social presence, the difference was statistically significant ($p = < 0.001$) and showed a medium effect size (Cohen's $d = 0.656$). Against expectations winning and losing also appeared have an interaction with competitive social presence, however the Cohen's $d = 0.219$ shows that this interaction was far less substantial than in cooperative social presence, see Table 5. Fig. 3 clearly shows that the effect of game outcome is far greater upon cooperative social presence than competitive social presence. In other words, being in a losing team does not substantially change the social connections players felt towards their opponents, but did substantially change the social connections players felt with their team-mates.

Fig. 4 shows the distribution of social presences scores for game outcome and the various social presence modules of the CCPIG, namely the competitive Modules 1.1 Awareness (of one's opponent) & 1.2 Engagement (with one's opponent), and cooperative Modules 2.1 (perceived team) Cohesion & 2.2 (team) Involvement.

The results suggest that game outcome has little interaction with Module 1.2 Engagement ($p = 0.422$ & Cohen's $d = 0.068$), but has some interaction with Module 1.1 Awareness ($p = < 0.001$ & Cohen's $d = 0.372$). The cooperative modules also showed differentiation, with Module 2.1 Cohesion ($p = < 0.001$ & Cohen's $d = 0.669$) showing more interaction than Module 2.2 Involvement ($p = < 0.001$ & Cohen's $d = 0.380$). These results show that both components of cooperative play are influenced by game outcome but that team cohesion is more strongly influenced than the sense of involvement in the team.

5.2. Individual games: cooperative

The combined data set showed a strong interaction between game outcome and cooperative social presence. Table 4 shows the three games with the highest number of respondents. These results would suggest that the extent to which game outcome affects cooperative social presence varies greatly from game to game. The T-test results show if the difference in scores between winning and losing for each module is significant, Cohen's d shows the actual size of any difference. While all the game data-sets show significance, the effect sizes of results differ from small (*Mount & Blade*) to very large (*Dota 2*).

The cooperative modules are affected to different extents in different games. Table 6 shows T-test p and Cohen's d values, carried out on the winning and losing data for each game. In particular, *Mount & Blade* does not show a significant difference between winning and losing on Module 2.1 Cohesion. On the other two games though, the effect on cohesion of winning or losing is much bigger than the effect on team involvement.

Table 4
Significance and effect size in cooperative social presence between players in winning and losing teams.

Data	T-Test T-Value	T-Test p-value	Cooperative Cohen's d
All	7.551	< 0.001	0.656
Dota 2	5.780	< 0.001	1.371
War Thunder	4.449	< 0.001	0.740
Mount & Blade	2.410	0.018	0.377

Table 5
Significance and effect size in competitive social presence between winning and losing.

Data	T-test p-value	Competitive Cohen's d
All	0.014	0.219
Mount & Blade	0.249	0.185
Dota 2	0.473	0.159
War Thunder	0.730	0.058

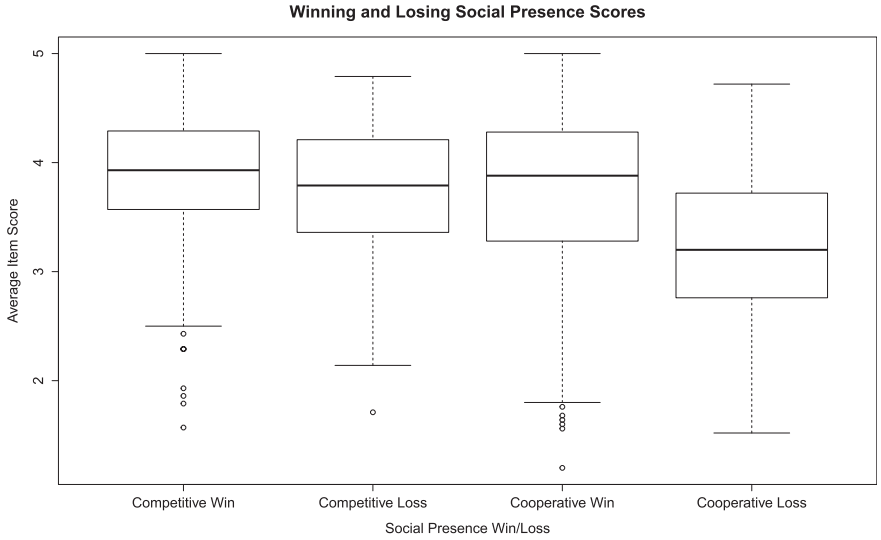

Fig. 3. Boxplot of the effects of winning and losing on competitive and cooperative social presence for all participants.

5.3. Individual games: competitive

The differences in overall competitive social presence also appear to vary from game to game. However, there is far less variation than in cooperative social presence, with the three games with the most respondents showing similar small and non-significant effect sizes (Table 5). The only individual game dataset which showed any interaction between outcome and competitive social presence was *CS:GO* (T-test p = 0.050, Cohen's d = 1.282), however the small number of participants in this dataset makes it difficult to draw strong conclusions from this result.

Table 7 gives a more fine grained view of the interaction between the competitive modules and game outcome. The data suggests that while Module 1.2 Engagement remains largely unaffected by win/loss conditions, Module 1.1 Awareness shows a differential effect across the games, see Table 7. Even so only *Mount & Blade* has a significant difference in the Awareness of winning and losing players.

6. Discussion

Cooperative presence was substantially higher for players that won compared with those who lost. Unexpectedly, competitive presence was also different between winners and losers though the effect was much smaller and only just achieved significance across all the games. Thanks to the larger dataset, it was possible to dig further into these broad results both in terms of the components of social presence embodied in CCPIG and three of the individual games.

For cooperative presence, the difference between winning and losing was seen overall in both components of 2.1 Cohesion and 2.2 of Team Involvement though the effect was bigger for Cohesion. It was notable though that across the three specific games, Involvement was always influenced by winning or losing. This suggests that losing and the players sense of involvement with each other are strongly related. Of course, it is not possible to say that winning or losing was the cause of the change in presence. It may be a team losing was due to players feeling less involved in their team or

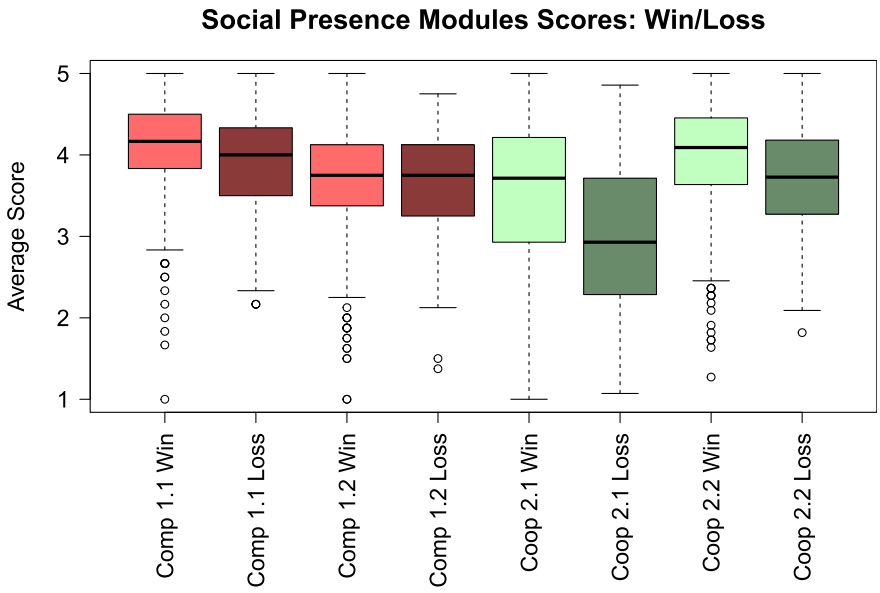

Fig. 4. Boxplot of the effects of winning and losing on the separate modules of the CCPIG for all participants.

Table 6
Significance & effect size in cooperative modules between winning and losing.

Data	T-test p-value Module 2.1 Cohesion	Cohen's d Module 2.1 Cohesion	T-test p-value Module 2.2 Involvement	Cohen's d Module 2.2 Involvement
All	< 0.001	0.669	< 0.001	0.488
Dota 2	< 0.001	1.501	< 0.001	0.875
War Thunder	< 0.001	0.875	0.027	0.369
Mount & Blade	0.075	0.284	0.006	0.457

Table 7
Significance and effect size in competitive modules between winning and losing.

	T-test p-value Module 1.1 Awareness	Cohen's D Module 1.1 Awareness	T-test p-value Module 1.2 Engagement	Cohen's d Module 1.2 Engagement
All	<0.001	0.372	0.422	0.068
Mount & Blade	0.019	0.416	0.616	0.077
Dota 2	0.103	0.367	0.960	0.011
War Thunder	0.626	0.080	0.772	0.050

because the team was less cohesive. Alternatively, the recalled experience of the games may be revised by winning or losing, so that players report more involvement upon a win or less on a loss regardless of the actual felt experience *during* play. To determine the exact nature of the interaction would require more controlled studies, however these two studies both show that game outcome is central to the cooperative social experience of team-based online games.

Looking at the competitive modules, Module 1.2 Competitive Engagement showed no significant difference in user scores both overall and across the individual games analysed. This reinforces the results of Study 1 in that players are able to assess the engagement of the opponents independently of the game outcome. And in some ways, without decent engagement, there would be no game at all. The difference in competitive social presence is therefore primarily due to difference in Module 1.1 Awareness though like Team Cohesion, differences are seen between the games. A reduced awareness of an opposing team when losing may seem counter-intuitive, after-all in team-based games we lose because the other team has won, to some extent their actions have caused our loss. Thus one may expect players to be more aware of their opponent during a loss. However, if the results are viewed from another perspective, it may be that players on the losing team feel that they were unable to accurately simulate the minds of their opponents, or possibly feel that they had little noticeable effect on the opposing team. This may be due to a sense of helplessness or loss of control due to being part of an unavoidable defeat. It may be that players on a losing team are more concerned with their team than their enemies, or perhaps being on a losing team equated to less time spent actively playing the game. Being on the losing team in team-based online games often leads to dying more frequently, and in these games dying usually means less time playing and more time waiting to respawn. The reduced time in-game may have caused respondents to consider their enemies less.

The study has also highlighted that across different game experiences, the extent to which game outcome affects cooperative

social presence varies substantially. *Dota 2* stands out in this study due to winning and losing having the most profound interaction with social presence. The effect size of Module 2.1 Cohesion between the winning and losing conditions is by far the largest, suggesting game outcome has a huge interaction with how players perceive their team's cohesion in *Dota 2*. It may be that because some of the respondents did not know what their team were doing for parts of the match. Or they assumed that if their team lost, their team-mates were not working together, and if they won then they were a cohesive unit. Alternatively, due to the strategic nature and RTS style elements of *Dota 2* it might be that, out of all the games in the study, *Dota 2* relies most heavily on team-coordination, and that players notice a lack of team cohesion far more than they might in a more hectic game with larger teams such as *War Thunder*. Another perspective might be that, being such a disparate game in terms of core mechanics, the *Dota 2* community is significantly different than the other communities which took part in this study, in that any social connection made by players with their team is hugely dependant on game outcome.

Teams in team-based digital games are often similar to swift starting action teams (STATs) (Wildman et al., 2012). Teams which are brought together to perform a task with little introduction and knowledge of each other's abilities. In these types of teams perceptions and trust rely on quick judgements about others based on shallow cues and pre-existing relationships. It may be that the matchmaking system in *Dota 2*, in which players are thrown together with strangers, increases the effects of game outcome due to the STAT nature of the team.

The *Dota 2* data set was the only one to produce a large effect size between the winning and losing conditions of Module 2.2 Team Involvement (Table 6). As the score for this module dropped significantly between the winning and losing conditions, this suggests that the respondents felt far less involved in their team in the event of a loss. It may be that the drop in team involvement was due mechanics within the game. In *Dota 2* (and other MOBAs) players get punished for abandoning a match before it is over, this is implemented as matches are generally created via matchmaking, a system which finds a player team-mates, opponents, and a server. As the team sizes are so small in *Dota 2*, abandoning a match without the possibility of a new player entering can be a great disadvantage to the abandoned team, thus a system is in place to punish people who abandon their team. However this system means that in the event of an inevitable defeat, a team may have to wait while their enemy slowly achieve victory. This may lead to a lack of player involvement in the team as the players wait around for the match to be over, wanting to quit but not being able to. In addition, at the time of this study, public games in *Dota 2* have no team surrender function. Thus, a mechanism intended to reduce griefing (Schell, 2014) by locking players in, may be having a substantial negative impact on social presence in players that are simply ready to quit. It should be noted that variations in team size across the games surveyed did not correlate with any other variable in this study, suggesting that the small team size in *Dota 2* is not the cause of the differences seen in social presence.

Mount & Blade showed very low, non-significant effect sizes in Module 2.1 Cohesion, suggesting that in these game experiences perceived cohesion is not affected by game outcome. If a player's perceived team cohesion has no interaction with game outcome, this would suggest that the respondents did not consider team coherence as an important factor in their team's performance. This could mean that player's regarded the skill of each individual in their team as more important than the overall level of team-work. A reduced level of perceived team cohesion when losing in a team-based game is understandable, 'we lost therefore we were disorganised'. In *Mount & Blade* however this is not the case, and the level of perceived cohesion remains constant in winning or losing. If the score of Module 2.1 was particularly low, one could argue that respondents felt the teams were consistently disorganised, and therefore game outcome had no effect, but an average score of 3.5 is not particularly high or low, but slightly above average for the data in this study. So if respondents felt their team cohesion was neither consistently very high or very low, the lack of change due to game outcome means that some other factor of *Mount & Blade* is creating a consistent level of perceived cohesion.

Looking to the open comments from respondents, most feedback on the subject of teamwork stated that public play is predominantly a 'free for all' with very little team-work, and that personal skill was more important than a cohesive team. It may be that due to the nature of the gameplay scenarios in *Mount & Blade*, there is a static level of cooperation that occurs. For example, in a *Mount & Blade* siege scenario, a large group of players is often surging up ladders or through castle gates as one large mass, meaning that whether the team wins or loses, they still appear to players as a cohesive unit. In pitched battles teams often become more fragmented, with groups of footsoldiers forming small groups while the cavalry works more independently. If both teams are acting in a similar manner then game outcome becomes less about one team being more organized than the other, but about individual skill and perhaps a degree of luck.

This may also be why *Mount & Blade* showed an significant difference in Awareness of the competitors (Table 7 Module 1.1) between winning and losing. When the gameplay is heavily dependent on a player's individual skill and potentially the player's ability to exercise their theory of mind to defeat their opponents in duels, it may be that when a team loses, players felt they had less awareness of their opponents and had less of an effect on their opponent's thoughts and actions.

War Thunder showed the second largest effect size of game outcome on cooperative social presence. Module 2.2 Involvement showed a medium effect size while Module 2.1 Cohesion showed a large effect size (Table 6). These results suggest that game outcome had a major interaction with cooperative social presence in *War Thunder*, and there was a particularly strong interaction between perceived team cohesion and game outcome. The only other game data to have similarly large effect sizes of game outcome on Module 2.1 is *Dota 2*, however as these games have very little in common in terms of gameplay mechanics, the similarities may be due to factors external to the game.

One similarity the two games do have is that players may not be able to keep track of the location of their team-mates and therefore may assume they were not acting cohesively if they lost the game. In *Dota 2* the RTS style perspective means the player can only see a limited area of the gameplay environment at one one time, and while there is a mini-map showing the location of their team-mates, it does not communicate their actions. In *War Thunder*, the inability to keep track of one's team-mates is a consequence of the large game environments. *War Thunder* has maps which range from 60 km × 65 km–200 km × 200 km in (simulated) size, in which most other aircraft appear as merely dots in the sky until one enters a dog fight, and even then opponents and team-mates are often far more distant than an opponent would be in any of the other games in this study. In *War Thunder* a player can see the names of their distant team-mates on screen to determine their location, but like *Dota 2*, cannot determine what their team-mates are actually doing.

6.1. Issues

One interesting issue in this study is that, while it can be argued that there is certainly some interaction between social presence and game outcome, it is not certain which is the active concept in

this interaction. Does victory lead to high social presence, or does high social presence lead to a more successful team? Whereas Picciano (Picciano, 2002) measured social presence and compared that to educational performance, the social presence and game outcome data presented here were gathered retrospectively using a single self-reported online survey.

The data from community surveys is entirely sourced from self reported online questionnaires, and thus it is likely to have some self-selection bias. This means that the respondents who took part in the study may present an unrepresentative sample causing skewed results. However, when tested, the study data was normally distributed, and the use of a prize draw to encourage participation is likely to have enticed respondents who might not normally have taken part, reducing the self selection bias. Respondents to community surveys are sourced from community forums, this means that the respondents are likely to be made up of players that not only play the game, but actively frequent community discussions about the game. Yee (Yee, 2006) discusses similar concerns with the sampling of the Daedalus Project, but states that the severity of any criticism is often overestimated and that sampling issues often have very little to do with what the project sets out to investigate.

One weakness of the community survey approach is the lack of control a researcher has over their participants. But by contrast, Study 1 did have experimental control but that comes at the cost of loss of ecological validity. And in either case, it is not possible to control the variable of whether players win or lose without further distorting the gaming experience. In both studies, like many other digital games studies (Frostling-Henningsson, 2009; Gow, Cairns, Colton, Miller, & Baumgarten, 2010; Yee, 2006) the community surveys discussed in this paper focus on the experiences of players of commercially available games. Thus this approach lends its self to gathering data which reflect real world gaming experience with high ecological validity, rather than being suitable for testing specific fine grained variables controlled through the use of custom made software, for example (Merritt, Ong, Leong Chuah, & McGee, 2011).

One of the most common comments from respondents was that the level of play be considered. Level of play does not necessarily refer to level of challenge, but to the perceived experience level of the players on a respondents team and of their opponents. Level of play seems to refer to the overall experience and understanding of the game the players on the server have. Respondents argue that the perceived level of play, and the balance of this level between the teams, strongly affects their experience of the game. This sentiment is supported by studies of *Dota 2* studies which found player expertise was a major determinant of team performance (Pobiedina et al., 2013b) and which found that the level of expertise measurably changed the way players behaved in game (Drachen et al., 2014).

7. Conclusions

Both studies in this paper suggest that game outcome has a significant interaction with cooperative social presence. It is interesting that while the overall results of Study 2 were close to what was expected, there was a great variety in the effect of game outcome from game to game. This shows that while game outcome can generally be expected to have some interaction with a player's experience and perceptions of their team, the specific nature of this effect depends on the game.

More specifically, the very large effects seen in *Dota 2* suggest that there are elements to the game that make winning and losing tightly interwoven with the team cohesion and involvement. In particular, players who lose have a substantially reduced sense of cooperative social presence compared with the winners and with the players of other games. In a world where social play is an important component of the playing experience, it may be that such suppressed social presence on losing is not a desirable feature of the game, particular when it is not rewarded by a correspondingly high social experience on winning. Of course, it is not possible to talk causally on the basis of these studies but it may be that the design of the game itself is leading to this effect and it is something that game designers need to be aware of. In such fast forming, small teams typical of MOBAs, it may be that there is a considerable cost to social experience in losing and this might be being exacerbated by features of the game. This might also be responsible for the high levels of "trolling" behaviour particularly seen in such games. Game developers may be able to ameliorate the effects of losing by considering more carefully how a team loses and whether it might be possible to lose "with dignity" to avoid such extreme experiences.

With competitive social presence it seems that this concept is generally unaffected by game outcome though where it is affected, this is in the awareness of the competing team rather than their engagement. From the studies here, it is possible to explain the differences seen in terms of the structure of the game but there is room for both examination of a wide-range of games and more controlled studies.

There is also an implication for the design of research in the area of social play. Due to the differences in social presence seen in different games when players win or lose, care is needed when analysing the data from studies into social play. Players in competition cannot be treated automatically as a single unit of analysis because the player who wins may have a stronger sense of presence than the player who loses. And in cooperative contexts, ignoring whether a team has won or lost can make a huge contribution to the variance in the data which could obscure the goals of the study.

Even though winning or losing is a crude measure of game outcome, effects are seen but research would also benefit from a more nuanced view of in-game performance in this context. This work though relatively large in scale has only begun to address the full range of issues in this area.

References

Altschuller, S., & Benbunan-Fich, R. (2010). Trust, performance, and the communication process in ad hoc decision-making virtual teams. *Journal of Computer Mediated Communication, 16*(1), 27–47.

Andrews, D., Nonnecke, B., & Preece, J. (2003). Electronic survey methodology: a case study in reaching hard-to-involve internet users. *International Journal of Human Computer Interaction, 16*(2), 185–210.

Biocca, F., & Harms, C. (2002). Defining and measuring social presence: contribution to the networked minds theory and measure. *Proceedings of Presence, 1–36*, 2002.

Biocca, F., Harms, C., & Burgoon, J. K. (2003). Toward a more robust theory and measure of social presence: review and suggested criteria. *Presence, 12*(5), 456–480.

Biocca, F., Harms, C., & Gregg, J. (2001). The networked minds measure of social presence: pilot test of the factor structure and concurrent validity. In *4th annual international workshop on presence, Philadelphia, PA* (pp. 1–9).

Cairns, P., & Cox, A. L. (2008). *Research methods for human-computer interaction* (Vol. 12). NY, USA: Cambridge University Press New York.

Cairns, P., Cox, A. L., Day, M., Martin, H., & Perryman, T. (2013). Who but not where: the effect of social play on immersion in digital games. *International Journal of Human Computer Studies, 71*(11), 1069–1077.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155.

Drachen, A., Yancey, M., Maguire, J., Chu, D., Yuhui Wang, I., Mahlmann, T. … Klabajan, Diego (2014). Skill-based differences in spatio-temporal team behaviour in defence of the ancients 2 (dota 2). In *Games media entertainment (GEM), 2014 IEEE* (pp. 1–8). IEEE.

Emmerich, K., & Masuch, M. (2013). Helping friends or fighting foes: the influence of collaboration and competition on player experience. In *FDG* (pp. 150–157).

Frostling-Henningsson, M. (2009). First-person shooter games as a way of connecting to people: brothers in blood. *CyberPsychology & Behavior, 12*(5), 557–562.

Gajadhar, B., de Kort, Y., & IJsselsteijn, W. (2008). Influence of social setting on player experience of digital games. In *CHI '08 extended abstracts on Human factors in*

computing systems, CHI EA '08 (pp. 3099–3104). New York: ACM Press.
Gaudiosi, J. (2011). Riot games' league of legends officially becomes most played pc game in the world. *Forbes July, 11*, 2012. http://www.forbes.com/sites/johngaudiosi/2012/07/11/riot-games-league-of-legends-officially-becomes-most-played-pc-game-in-the-world/#338133e36ae2.
Gow, J., Cairns, P., Colton, S., Miller, P., & Baumgarten, R. (2010). Capturing player experience with post-game commentaries. In *Proceedings of the international conference on computer games, multimedia, and allied technologies (CGAT), Singapore. Citeseer*.
Hudson, J. M., & Bruckman, A. (2004). Go away: participant objections to being studied and the ethics of chatroom research. *The Information Society, 20*(2), 127–139.
Hudson, M., & Cairns, P. (2014a). Measuring social presence in team-based digital games. In *Interacting with presence: HCI and the sense of presence in computer-mediated environments* (p. 83).
Hudson, M., & Cairns, P. (2014b). Interrogating social presence in games with experiential vignettes. *Entertainment Computing, 5*(2), 101–114.
Hudson, M., Cairns, P., & Imran Nordin, A. (2015). Familiarity in team-based online games: the interplay between player familiarity and the concepts of social presence, team trust, and performance. In *Advances in visual informatics* (pp. 140–151). Springer.
Ivory, J. D., & Kalyanaraman, S. (2007). The effects of technological advancement and violent content in video games on players feelings of presence, involvement, physiological arousal, and aggression. *Journal of Communication, 57*(3), 532–555.
Jansz, J., & Tanis, M. (2007). Appeal of playing online first person shooter games. *CyberPsychology & Behavior, 10*(1), 133–136.
Järvelä, S., Matias Kivikangas, J., Kätsyri, J., & Ravaja, N. (2013). Physiological linkage of dyadic gaming experience. *Simulation & Gaming*, 1046878113513080.
Johnson, D., Nacke, L., & Wyeth, P. (2015). *All about that base: Differing player experiences in video game genres and the unique case of moba games*.
Juul, J. (2011). *Half-real: Video games between real rules and fictional worlds*. MIT press.
Juul, J. (2013). *The art of failure: An essay on the pain of playing video games*. Mit Press.
de Kort, Y. A. W., IJsselsteijn, W. A., & Poels, K. (2007). Digital games as social presence technology: development of the social presence in gaming questionnaire (spgq). In *Proceedings of presence, 195203*.
Lin, J. (2013). *The science behind shaping player behavior in online games*. Presented at GDC 2013 http://gdcvault.com/play/1017940/The-Science-Behind-Shaping-Player.
Matias Kivikangas, J., Ktsyri, J., Jrvel, S., & Ravaja, N. (07 2014). Gender differences in emotional responses to cooperative and competitive game play. *PLoS One, 9*(7), e100318. http://dx.doi.org/10.1371/journal.pone.0100318. URL http://dx.doi.org/10.1371%2Fjournal.pone.0100318.
Matias Kivikangas, J., & Ravaja, N. (2013). Emotional responses to victory and defeat as a function of opponent. *IEEE Transactions on Affective Computing, 4*(2), 173–182.
McCluskey, A., & Lalkhen, A. G. (2007). Statistics iv: interpreting the results of statistical tests. *Continuing Education in Anaesthesia, Critical Care & Pain, 7*(6), 208–212.
Merritt, T., Ong, C., Leong Chuah, T., & McGee, K. (2011). Did you notice? artificial team-mates take risks for players. In *Intelligent virtual agents* (pp. 338–349). Springer.
Murthy, D. (2008). Digital ethnography an examination of the use of new technologies for social research. *Sociology, 42*(5), 837–855.
Nash, E. B., Edwards, G. W., Thompson, J. A., & Barfield, W. (2000). A review of presence and performance in virtual environments. *International Journal of Human Computer Interaction, 12*(1), 1–41.
Picciano, A. G. (2002). Beyond student perceptions: issues of interaction, presence, and performance in an online course. *Journal of Asynchronous Learning Networks, 6*(1), 21–40.
Pobiedina, N., Neidhardt, J., Calatrava Moreno, M. del C., & Werthner, H. (2013). Ranking factors of team success. In *Proceedings of the 22nd international conference on world wide web companion* (pp. 1185–1194). International World Wide Web Conferences Steering Committee.
Pobiedina, N., Neidhardt, J., Calatrava Moreno, M. C., Grad-Gyenge, L., & Werthner, H. (2013). *On successful team formation. Technical report*. Technical report. Vienna University of Technology. Available at: http://www.ec.tuwien.ac.at/files/OnSuccessfulTeamFormation.pdf.
Poels, K., de Kort, Y., & Ijsselsteijn, W. (2007). It is always a lot of fun!: exploring dimensions of digital game experience using focus group methodology. In *Proceedings of the 2007 conference on future play* (pp. 83–89). ACM.
Randy Garrison, D. (2007). Online community of inquiry review: social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks, 11*(1), 61–72.
Randy Garrison, D., & Kanuka, H. (2004). Blended learning: uncovering its transformative potential in higher education. *The Internet and Higher Education, 7*(2), 95–105.
Rockinson-Szapkiw, A. J. (2009). *The impact of asynchronous and synchronous instruction and discussion on cognitive presence, social presence, teaching presence, and learning*. Regent University.
Ryan, R. M., Scott Rigby, C., & Przybylski, A. (2006). The motivational pull of video games: a self-determination theory approach. *Motivation and Emotion, 30*(4), 344–360.
Sallnäs, E.-L. (2004). *The effect of modality on social presence, presence and performance in collaborative virtual environments*. Doctoral dissertation.
Schell, J. (2014). *The art of game design: A book of lenses*. CRC Press.
D. G. M. Schouten. Shared experience: the influence of the in-game social connection on the player experience in digital gaming. tue. nl, 2014.
Schroeder, R. (2002). Copresence and interaction in virtual environments: an overview of the range of issues. In *Presence 2002: Fifth international workshop* (pp. 274–295).
Selnow, G. W. (1984). Playing videogames: the electronic friend. *Journal of Communication, 34*(2), 148–156.
Sherry, J. L., Lucas, K., Greenberg, B. S., & Lachlan, K. (2006). Video game uses and gratifications as predictors of use and game preference. *Playing Video Games: Motives, Responses, and Consequences*, 213–224.
Shin, N. (2002). Beyond interaction: the relational construct of'transactional presence'. *Open Learning, 17*(2), 121–137.
Usoh, M., Alberto, C., & Slater, M. (1996). *Presence: Experiments in the psychology of virtual environments*. UK: Department of Computer Science, University College London.
Van Selm, M., & Jankowski, N. W. (2006). Conducting online surveys. *Quality and Quantity, 40*(3), 435–456.
Vella, K., Johnson, D., & Hides, L. (2015). Playing alone, playing with others: differences in player experience and indicators of wellbeing. In *Proceedings of the 2015 annual symposium on computer-human interaction in play* (pp. 3–12). ACM.
Wildman, J. L., Shuffler, M. L., Lazzara, E. H., Fiore, S. M., Shawn Burke, C., Salas, E., et al. (2012). *Trust development in swift starting action teams: A multilevel framework*. Group & Organization Management, 1059601111434202.
Wright, K. B. (2005). Researching internet-based populations: advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of Computer Mediated Communication, 10*(3), 00–00.
Yee, N. (2003). *The daedalus project* [Online] Retrieved: 30/10/15, Available: www.nickyee.com/daedalus.
Yee, N. (2006). Motivations for play in online games. *CyberPsychology & Behavior, 9*(6), 772–775.