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Exploring player experience in ranked League of Legends

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ABSTRACT

While video games provide different Player Experiences (PE), some genres can provide particularly unique PEs driven by their particular features. Such is the case of MOBA (Multiplayer Online Battle Arena) games, currently led in number of players and popularity by League of Legends. In spite of this popularity, PE in MOBA games remains largely unexplored. We aim to explore this gap by presenting a PE study that focuses in League of Legends and its player base. After surveying more than 400 players in the database of the largest eSports organisation in Spain, a series of tests were run from multiple perspectives using the PENS (Player Experience of Need Satisfaction) model and the SPGQ (Social Presence in Gaming Questionnaire) as response variables. Among our findings, we show how PE differs across different levels of competence (or rank) inside the game. When looking at how team play impact PE, results show how PENS dimensions remain unaffected while empathy is driven by playing with known teammates. Role selection, on the other hand, has an arguably insignificant impact in PE. Last but not least, an invariant behavioural engagement across all dimensions shows how players perceive team collaboration as an essential factor for success.

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Player experience; social presence; League of Legends; MOBA; user studies; interactive games

1. Introduction

Multiplayer Online Battle Arena (MOBA) games are a subgenre of Real-Time Strategy (RTS) games in which two teams, typically consisting of five players each, compete against each other with each player controlling a single character. Contrary to RTS games, there is no unit or building construction in a MOBA game, so much of the strategy revolves around individual character development and cooperative team play in combat (Yang, Harrison, and Roberts 2014). A wide range of predefined actions for supporting social interaction (e.g. friendship, communication, trade, enmity, aggression and punishment) reflects either positive or negative connotations among game players, and they are unobtrusively recorded by game servers (Kwak, Blackburn, and Han 2015). Data is easily available and can be used to study human relations and behavioural patterns. Thus, it represents an unprecedented opportunity to observe social interaction on the large scale (Pobiedina et al. 2013). MOBA games provide all that is needed to take advantage of this opportunity: scale, data and relevancy.

League of Legends (also known as *LoL*) is the most played PC game in Europe and the U.S. and among MOBAs in particular.[1] Released in 2009, its active player base has been growing since its launch. In 2014, Riot, the company that develops *League of Legends*, stated that 67 million people were playing each month. In 2016, seven years into the game's life, that number has surpassed 100 million.[2] On top of this, *League of Legends* is also the most watched game on streaming platforms such as Twitch.[3] *League of Legends* is also one of the drivers behind eSports' growth: the 2016 LoL World Championships reached 43 million unique viewers and a peak concurrent viewership of 14.7 million viewers.[4] Furthermore, the amount of data recorded by Riot's servers together with an accessible API (available at https://developer.riotgames.com/) make of *League of Legends* a perfect candidate for analysis.

As players spend increasingly more time playing MOBA games such as *League of Legends*, attention is turning on the possible positive and negative impacts of doing so. 'The uniqueness of gaming experience is one important reason for the success of digital games in general […] therefore, it is important to know how player experience is structured to systematically address mechanisms that elicit player experience' (Wiemeyer et al. 2016, 244). King, Delfabbro, and Griffiths (2010, 2011) have argued that multiple structural characteristics of video games may influence player behaviour. When studying the effects of gaming, researchers need to take into account game features and genres. Relationships between game genre, personality and gaming experience were also found by Johnson et al. (2012). It is important, however, to distinguish User Experience (UX) from

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Player Experience (PE). As Lazzaro (2008) argues, UX is the experience of use (so, it looks at what prevents the ability to play) while PE is the experience of play (so it looks at what prevents the player from having fun). One could debate, however, whether fun is a requirement in a game, so it might be more accurate to say that PE looks at what prevents the player from being *engaged*. To understand the unprecedented success of online competitive games such as *League of Legends* and the reasons behind its millions of loyal and engaged players it is essential to analyse its unique PE (Johnson, Nacke, and Wyeth 2015) in detail, and look not only at the differences across genres but also at the internal differences among MOBA players. Results from doing so can be applied in two dimensions: first, game designers could use a better understanding of PE for a particular target audience to design games better suited to them; second, MOBA developers, who are constantly changing and balancing the game via periodic software patches, could also look at how to balance differing PE across their own player base. In both cases, the ultimate beneficiary would be the same: the player.

This paper aims to understand and explore the PE in *League of Legends* as a particular case of the MOBA genre. First, we'll explore whether different levels of skill have an influence on PE and Social Presence. Afterwards, we will look at how team composition (namely team formation and team role) interact with these dimensions.

Results show how higher ranked players feel more confident on their competence and how premade teams display a higher level of empathy among their players, but also seem to demonstrate how PE differs minimally across roles and how social presence shows no statistical differences at any level of skill, finding a few invariant dimensions that could be useful to establish common ground among MOBA players.

First, details about League of Legends and its internal mechanisms will be presented to facilitate understanding of later sections. Related work is discussed in Section 3, regarding both PE research and MOBA related research. Material and methods, covering the details on both the questionnaires and participants, are described in Section 4. In Section 5, results are presented and are further discussed in Section 6. Subsequently, conclusions will summarise the main findings while future work will open new lines to be explored.

2. League of Legends

League of Legends is a MOBA game that follows a freemium model, but where the in-game transactions do little to impact a player's performance or ability. Players are identified using a Summoner name (their nickname in the game) and are classified inside the game according to their proven skill (Rank). As of December 2016, there are 134 Champions (player characters) available to choose, each with a different set of abilities and different base stats. Each Champion is arguably better suited for a particular playing position. Over the years, these positions have evolved and are currently set according to the lanes: one 'top', one 'mid' and one 'bot', with a 'jungler' gathering the resources in the jungle between lanes and a 'support' which would, in theory, have some degree of freedom to provide utility to the team but it is usually linked to the 'bot' player/position. During the game, each player earns gold from multiple sources and can use it to purchase multiple items that have the power to enhance the Champion. The combination of a Champion and the chosen items is called a 'build'.

Riot Games uses a Free-to-Play model for *League of Legends*; this means that the game can be downloaded and played for free but some content needs to be paid for, using either real currency (which is previously used to purchase 'Riot Points') or in-game currency (in this case, named 'Influence Points') which is obtained in different amounts at the end of each match. Champions (player avatars) can be purchased using both types of currency but skins (appearances that can be purchased to customise a particular Champion) can only be purchased using real-world money. In any case, it is important to notice that skins are only eye candy, gimmicks that change the looks of the player-controlled character and/or his abilities, therefore not directly impacting gameplay (Mora-Cantallops and Sicilia 2016).

In *League of Legends*, teams are composed by five human players each, but these five players can be joined in multiple different combinations, from 'solo' (which means that the player enters the queue alone and the matchmaking system finds the rest of the team to play with) to a full team composition. Furthermore, each player takes a role in the team. Current matchmaking system actually lets players express their preferences and assigns them to a role, which also has an effect on the range of avatar characters (known as *Champions* in the game) that the player will choose, as some are better suited for a role than others depending on the metagame at the time (Donaldson 2015). Role definitions have evolved from season to season, but stabilised at five main roles. Three players control the lanes (Top, Mid and Bottom) while Support provides utility to the team (spending most of the game paired with Bottom) and Jungle makes use of the resources in-between lanes (see Figure 1). Players can also choose to 'Fill', which means that they will take any free role. *League of Legends* is a team game; all five roles are relevant. Support in

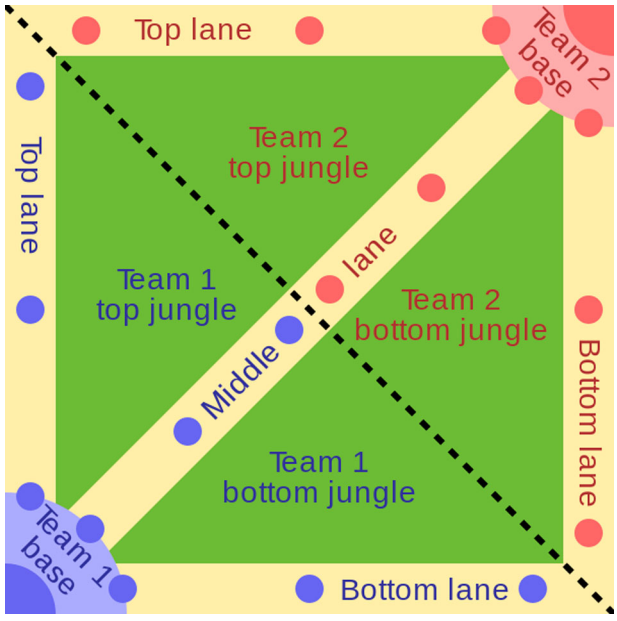

Figure 1. Typical MOBA map (with labelled lanes) for illustrative purposes. Original PNG version by Raizin, SVG rework by Sameboat (file:Map of MOBA.png (CC 3.0), CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid = 29443207).

particular is often in charge of controlling the flow of the match and map vision. As critical as it might be, Support players obtain 'lower visibility and satisfaction' for their achievements, as discussed by Riot, the developer, itself.[5] By contrast, damage dealers often 'get great celebrations of their skilled play'.

To introduce new features in the game while keeping the balance, Riot Games releases compulsory patches, usually biweekly. Besides new features, these patches are used to multiple ends, but in most cases they target Champions or items that became too dominant (thus being played by most of the players) or that are too weak in comparison (thus, nobody is playing them). Riot Games also provides players with free access to the API, a set of tools that can be used to extract player and game data for further research.

In *League of Legends*, players are ranked accordingly to their skill level. There are seven tiers in the so-called ladder, in increasing order of skill: Bronze, Silver, Gold, Platinum, Diamond, Master and Challenger. After a few placement matches, players get placed in competition categories (League tiers), and subcategorised into Divisions. The main objective becomes then to climb the ladder by continuously winning matches. Behind this ranking (and using an undisclosed calculation in the case of *League of Legends*) there is an Elo rating system similar to the one originally used for chess players. In short, it is assumed that a player's performance has a normal variation among games; the mean of that distribution is the Elo rating, which is determined by the win/loss statistics. Therefore, a player with a high Elo performs, in average, better than a player with a lower Elo. This is important as, once players are ranked accordingly, it's much easier to set 'fair' matches between players of a similar skill level, which is crucial for a good PE (Véron, Marin, and Monnet 2014).

Rank distribution changes over the season and can be different depending on the region, but in general, Silver is the most populated division followed by Bronze and Gold. All three account for 90% of the players, while the top 10% are Platinum or above and only 2% are Diamond or above.[6] Less than 0.1% players are in Master or Challenger; this last one, actually, is limited to 200 players.

3. Related work

3.1. Player experience

Since interest in UX (later shifted to PE) started to grow, numerous different concepts have been used (or proposed) to describe it (Brown and Cairns 2004; IJsselsteijn et al. 2007; McMahan 2003; Nakatsu, Rauterberg, and Vorderer 2005; Sweetser and Wyeth 2005). However, there is a degree of overlap among the concepts and as a consequence, numerous challenges to understanding and actually measuring them (Takatalo et al. 2010, 28).

Over time, multiple psychological models have been developed, trying to explain the structure of PE and the factors that contribute to it. A few models (e.g. SDT [Ryan and Deci 2000], ARCS [Keller 2010], Flow [Nakamura and Csikszentmihalyi 2014]) have a wider range of applications than gaming, while others (e.g. GameFlow [Sweetser and Wyeth 2005], FUGA [Poels, de Kort, and IJsselsteijn 2008], CEGE [Calvillo-Gámez, Cairns, and Cox 2010]) have been developed specifically for the game domain. The Player Experience of Need Satisfaction (PENS), cited in Wiemeyer et al. (2016, 247–248) as one of the most influential approaches, will be used in this study. It is based in the theory of self-determination (SDT), as proposed by Ryan and Deci (2000) and extended by Ryan, Scott Rigby, and Przybylski (2006) (see also Przybylski, Scott Rigby, and Ryan 2010) to the PENS.

While models aim to explain PE, scales and surveys are methods developed to measure it. Two recent examples of these are the Play Experience Scale (Pavlas et al. 2012) and the Game User Experience Satisfaction Scale (GUESS), by Phan, Keebler, and Chaparro (2016), but the most widely used questionnaires are the Immersive Experience Questionnaire (IEQ) (Jennett et al. 2008) and the Game Experience Questionnaire

(GEQ) (Brockmyer et al. 2009). Together with the PENS model, these are considered the three dominant tools in gaming research (Denisova, Imran Nordin, and Cairns 2016). The PENS questionnaire has been validated already in multiple studies across several fields, as PENS can be applied to a wide array of situations: a few examples are Serious Games (Gerling et al. 2014), Personality vs Motivation in Video Games (Johnson and Gardner 2010) and even how control devices impact on the PE (McEwan et al. 2012).

Although GEQ was finally discarded in favour of PENS, De Kort, IJsselsteijn, and Poels (2007) noticed the relevance of social context in digital gaming and developed an additional scale called Social Presence in Gaming Questionnaire (SPGQ) as a GEQ companion, in order to probe gamers' involvement with their co-players. As next subsection will show, previous research has found that collaboration and social ability are of huge importance in MOBA games; thus, in order to assess this effect in our sample, SPGQ will also be used to complement the PENS assessment.

3.2. Previous work

Despite its relevancy and impact in market share, PE in *League of Legends* is still largely underexplored (Mora-Cantallops and Sicilia 2018). Ghuman and Griffiths (2012) noticed how online gaming research literature tended only to examine a single genre: Massively Multiplayer Online Role Playing Games (MMORPG) such as *World of Warcraft*. Therefore, their study aimed to examine player behaviour and characteristics in these three different online gaming genres: First Person Shooter (FPS) Games, Role Play Games (RPG) and RTS Games. However, MOBA Games were left out in most of those studies, which could be partially explained because of their novelty. Social interaction and social network formation has also been a topic of interest for *World of Warcraft* and other MMORPG (Bardzell et al. 2008; see also Ducheneaut et al. 2006a, 2006b; Ducheneaut and Moore 2004) and for online FPS (Xu et al. 2011).

As social and business groups are becoming more reliant on online communication (Monzani et al. 2014), the need to explore group processes, behaviours and relationships in online environments arises. Many studies focus in MMORPGs because collaboration, competition and social ability in these environments are of huge importance (Christou et al. 2013). In spite of this, Buchan and Taylor (2016) suggest that, as team formation and team participation in MMORPGs is voluntary, they might not be the most appropriate environment to explore group processes. As they argue, MOBAs present an arguably better environment to do so, as 'the game objective cannot be completed whilst playing alone'.

Kou and Gui (2014) conducted an ethnographic study to understand how temporary teams fulfilled complex tasks in *League of Legends*, while Kim et al. (2016) and Ong, Deolalikar, and Peng (2015) explored optimal team compositions in different perspectives: the former explored how players negotiate the proficiency-congruency dilemma (whether selecting roles that best match their experience or roles that best complement the other roles in the team) while the latter looked at optimal team compositions based on individual play style combinations. Shores et al. (2014) conducted a comprehensive study on deviant behaviour and focused on player toxicity and its relation to retention, which could be somehow related to PE. Implicit social networks were studied by Losup et al. (2014) and they concluded that MOBA games are also different from other genres from a team perspective; teamwork is key to success. Johnson, Nacke, and Wyeth (2015) built on these and their previous works (Johnson and Gardner 2010; Johnson et al. 2012) and identified multiple differences in PE among genres. MOBA games in particular emerged as providing a uniquely different PE, showing less presence, less immersion, less autonomy, more frustration and more challenge than other genres. As MOBA player base was small ($n = 33$), no further intra-genre dive was conducted until the same research team undertook a second study focused exclusively on MOBA players (Tyack, Wyeth, and Johnson 2016). As a result, they found a duality: while people 'most frequently begin to play MOBAs as a shared activity with friends' and 'experience significantly improved mood when playing with friends', MOBA players 'either don't expect or don't want strangers to display social characteristics', unlike MMORPGs or online FPS players.

Additionally, Bonny and Castaneda (2016) examined how MOBA game players use schemas to organise and anticipate information and found that MOBA games (and their players) provide an appropriate environment to study skill acquisition. Bonny, Castaneda, and Swanson (2016) also proposed a novel approach to gaming research in MOBA games, recruiting and testing participants in a MOBA gaming tournament, suggesting that this approach could provide an additional dimension of richness to gaming expertise that might not be available when recruiting players in other environments.

All in all, and according to the existing literature, MOBA games seem to present a unique opportunity to explore group processes and online behaviours, while providing a singular PE that is not found in other genres.

4. Material and methods

4.1. Research questions

When a player intends to join a *League of Legends* match, he or she is affected by three main variables that determine who the player will be playing with; one is set by the game depending on the player's skill (rank) and the other two are premade choices by the player (team formation and chosen role). Players can improve their rank only by winning matches, but they can choose their role and whether to enter alone or together with friends. These three parameters are the ones we are interested in exploring and, therefore, we pose the following research questions:

RQ1: How does Rank interact with Player Experience in League of Legends?

RQ2: Does team formation impact PE in League of Legends?

RQ3: Does PE differ depending on the chosen role in League of Legends?

4.2. Questionnaires

Many questionnaires are available to measure PE but, eventually, researchers tend to turn to the easily accessible and reliable (validated) questionnaires. As Johnson et al. (2014) discuss in their study, PENS and GEQ are recommended because 'they offer multiple subscales designed to assess different components of PE and they have been widely used in previous research'. After examining how PENS and GEQ where structured, Brühlmann and Schmid (2015) concluded that PENS appeared to be more consistent than GEQ in its results, and therefore it will be the main approach we will use to analyse PE in League of Legends.

The PENS model includes the following five dimensions: autonomy, competence, relatedness, presence and intuitive controls. In-game autonomy relates at how free players feel to make choices within the game. In-game competence denotes whether game challenges and player competence is balanced. In-game relatedness is concerned about the degree of connection between the player and the other players. Presence relates to physical, emotional and narrative presence, while intuitive controls are connected with the ease of control when playing.

As collaboration and social ability are of huge importance in MOBA games, SPGQ will also be used to complement the PENS assessment. SPGQ is composed of three subscales: two dealing with psychological involvement (Empathy and Negative Feelings, measuring positive and negative feelings towards co-players) and the last one dealing with behaviour (Behavioural Engagement, measuring the degree to which players feel their actions to be dependent on their co-players actions).

The PENS (Ryan, Scott Rigby, and Przybylski 2006) questionnaire is a 21-item instrument self-assessed using a 7-point Likert-style scale. The PENS questionnaire was used in the current study as originally proposed by the scale authors. On the other hand, the SPGQ is also a 21-item instrument, but it's assessed using a 5-point Likert-style scale instead, valued from 0 to 4.

The final questionnaire targeted *League of Legends* players and included the randomised PENS and SPGQ questions in conjunction with other questions regarding personal demographics (gender, age), game demographics (Summoner name, years of experience and perceived Rank) and additional comments (which was left free).

4.3. Participants

Between July and September 2016, 547 participants completed an online survey that was distributed (via email) to 20,000 active ranked users in the LVP (*Liga de Videojuegos Profesional*[7]) database. The LVP database contains players that are registered in their website and, at the time of the study, it included 68,410 ranked players. With over 250,000 registered players, the LVP – Spanish Pro League is the biggest eSports organisation in Spain, managing the most prestigious competitions (Division of Honour), tournaments and other amateur competition systems (LVP Arena) and broadcasting international events in Spanish such as the *League of Legends* Championship Series and the *Call of Duty* World League.

The study targeted ranked players due to two main reasons. First, players achieve ranked status only after they get past the 30 level game tutorial. Therefore, there is no 'novice' effect that could impact PE. Second, the *League of Legends* API only fully records data for ranked matches, converting unranked data in technically unreachable. As Summoner name is considered personal information, it was entered optionally and manually in the questionnaire, reducing the final number of complete entries to 439. For the current study's purpose, however, one additional entry was removed (a single respondent was identified as Master in rank, which made him an outlier). Final demographics are, therefore, $N = 438$, age between 13 and 35 years of age (average sits at 19.4 with a standard deviation of 3.45). 93.8% are male ($N = 411$, average 19.2 years of age, $SD = 3.36$) and 6.2% are female ($N = 27$, average 21.96 years of age, $SD = 3.87$).

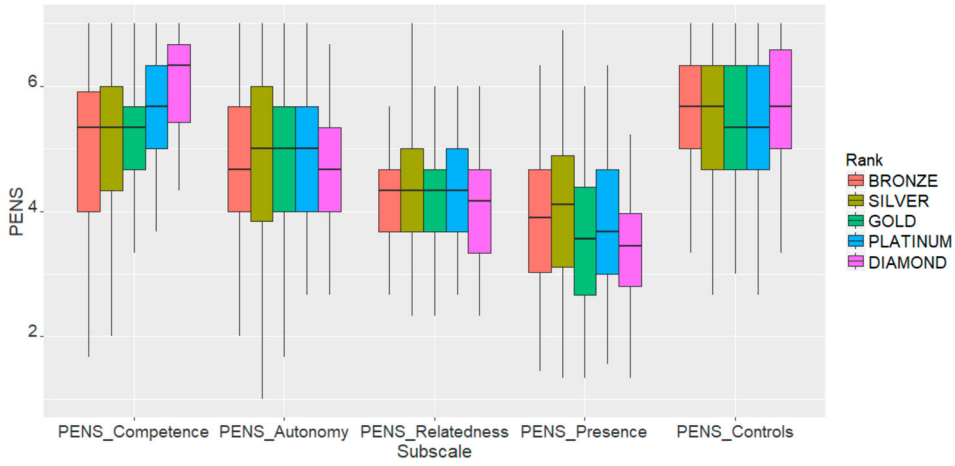

Figure 2. PE in League of Legends per rank tier.

5. Results

5.1. Reliability

Before starting, an internal reliability check was conducted. For PENS, Cronbach's alpha resulted in .68. According to Kline (1999), values over .7 indicate good reliability, so .68 can be deemed as acceptable. Cronbach's alpha wouldn't improve significantly if any variable would be dropped. Significant positive correlations between all five subscales of the PENS were found but most were relatively small ($r \leq .35$). Only Competence-Controls ($r = .4$) and Autonomy-Presence ($r = .64$) showed higher correlation. For SPGQ, Cronbach alpha was well above .7 and, although correlation was found between all three subscales, all were relatively small ($r \leq .32$).

5.2. Player experience and skill level

Players were asked for their perceived skill (rank tier). Afterwards, that rank was checked using the API and substantial differences were found between the reported and the real rank at the end of the Season 6, which will be used for calculations. As shown in Table 1, many players evaluate their own skill level at a higher rank than they actually are, which could potentially be a source of frustration (and a negative impact in some dimensions of their PE) for lower skilled and lower ranked players.

Table 1. Sample size per tier.

Tier	API (Real)	% (Real)	*N* (Reported)	% Reported
Bronze	62	14.16	22	5.02
Silver	127	29.00	65	14.84
Gold	123	28.08	146	33.33
Platinum	84	19.18	122	27.85
Diamond	42	9.59	69	15.75
Master	0	0.00	0	0.00
Challenger	0	0.00	6	1.37

After this preliminary check, we proceeded to compare all five PENS dimensions as a function of the player's rank to answer RQ1 (Figure 2). In this case, as we also had more than two groups to compare, the Kruskal-Wallis test was used. A Dunn's test (corrected using the Holm-Bonferroni method) was executed afterwards to follow up all multivariate effects where significant differences were found. For Dunn's test results, only significant *p*-values are listed (Table 2).

Results show how only Competence and Presence show statistical differences, although in the case of the latter, Dunn's test differences are only marginally significant at a 95% confidence level.

Statistically, different levels of Competence define two groups: the masses (Bronze, Silver and Gold), composed by 90% of the players, and the elites (Platinum and Diamond), formed by the top 10% players. As it would be expected, players in the top divisions (Platinum or Diamond) feel more competent (or good at the game, as validated by their placement) and therefore perceive the game as more balanced

Table 2. Kruskal-Wallis and Dunn's tests results for PE as a function of player's Rank.

Dimension	χ^2	*p*-Value
Competence	38.272	<<.001
Autonomy	3.7986	.434
Relatedness	2.9997	.558
Presence	12.726	.013
Controls	2.3261	.676
More > Less	*z*	Adj. *p*-value
COMPETENCE		
Platinum > Bronze	3.4887826	.003
Platinum > Silver	3.5322105	.003
Platinum > Gold	2.8945886	.019
Diamond > Bronze	4.8157866	<<.001
Diamond > Silver	4.9159894	<<.001
Diamond > Gold	4.4091786	<<.001
PRESENCE		
Silver > Diamond	2.8134	.049
Silver > Gold	2.7774	.049

Table 3. Kruskal-Wallis and Dunn's tests results for SPGQ as a function of player's team formation preference.

Dimension	χ^2	*p*-Value
Empathy	11.372	.009875
Negative Feelings	2.0642	.5592
Behavioural Eng.	0.66508	.8814
More > Less EMPATHY	*z*	Adj. *p*-value
Full Premade > Solo	2.944037	.019
Three / Four > Solo	2.556991	.053
Full Premade > Duo	2.182412	.12

(or, in other words, 'fairer' to them). On the other side, Bronze, Silver and Gold players are stuck with the vast majority (~90%) of the population. While is possible that many players acknowledge their lower level of skill (compared to their higher ranked counterparts), others might simply blame *League of Legends*' balance for their placement, as most players in our sample tended to overestimate their perceived skill, leading to lower scores in their answers to in-game Competence related questions.

SPGQ results, on the other hand, show how feelings towards other players, both positive and negative, are similar at all ranks. Although the Kruskal-Wallis test delivered a significant *p*-value for Empathy (.037) in the first place, no multivariate effect was found once adjusted using the Holm-Bonferroni method. Behavioural engagement didn't show any significant difference either.

5.3. Team play and player experience

In our survey, players were also asked for their play preferences. In our sample, 18% of the players ($N = 77$) prefer to go 'Solo'. As *League of Legends* has a strong social component, however, more often than not players like to enter the queue with friends: 37% of them prefer to go in 'Duo' ($N = 163$) while 36% ($N = 159$) usually aim to form premade teams of three or four people. Finally, 9% ($N = 40$) answered that they usually prefer to join the queue with a full premade team (that's a five-player team, so no strangers will join). A Kruskal-Wallis test was used to determine whether any group presented statistical difference.

Team formation (RQ2) didn't show statistical relevance in any of the PENS measures at 95% confidence level. Competence had the lower *p*-value (*p*-val = .1) but the other dimensions had *p*-values all higher than .6. Previous studies show, however, how social interactions (and friends and particular) are relevant to MOBA Games. For Tyack, Wyeth, and Johnson (2016) 'people most frequently begin to play MOBAs as a shared activity with friends' while 'the strong social motivation for beginning play stands in sharp relief to its absence among the most popular reasons for churning' Another finding from the same study showed how MOBA players either don't expect or don't want strangers to display social characteristics, as game system indirectly discourages long-term group formation, in contrast to MMORPG's required collaboration to achieve higher challenges. PENS Competence is related to in-game balance between player competence and the game challenge; thus, it could be expected that playing with friends would bring better communication and, therefore, better performance. This doesn't hold true, however, as *League of Legends* matchmaking will always aim to match premade teams with other premade teams, neutralising any potential advantage. Nevertheless, team formation impacts player mood, with players experiencing 'significantly improved mood when playing with friends, as opposed to strangers' (Tyack, Wyeth, and Johnson 2016).

This finding is consistent with the SPGQ results (Figure 3), but this scale is able to provide additional insight. After the Kruskal-Wallis test showed statistical significant differences in Empathy, a Dunn's test (corrected using the Holm-Bonferroni method) was executed (Table 3).

Players that come into the game with full premade teams (composed of five people that already know each other) experience a significant higher positive involvement with the other players in their team (adjusted *p*-value: .019). Although not significant at the chosen confidence level, low *p*-values are also found between teams composed by three or four people and solo players, and between full premade teams and duos.

Negative feelings toward co-players appear to be, however, unaffected by team formation. Players seem to experience the same level of negatively toned emotions against their teammates regardless of whether they are friends or strangers. Playing with friends would, therefore, improve player's moods but would make no difference in their jealousy or revengeful feelings. Last but not least, it becomes clear that players, whether playing alone or with a full team, are fully aware of the interdependences of each other's actions.

5.4. Roles and player experience

Role distribution in our sample is presented in Table 4.

Results for Role (RQ3) are shown in Table 5, with Dunn's test results corrected using the Holm-Bonferroni method. Results show how although PE might differ across roles, it would only do it so slightly and mainly points to Mid as a particular case that deserves further exploration.

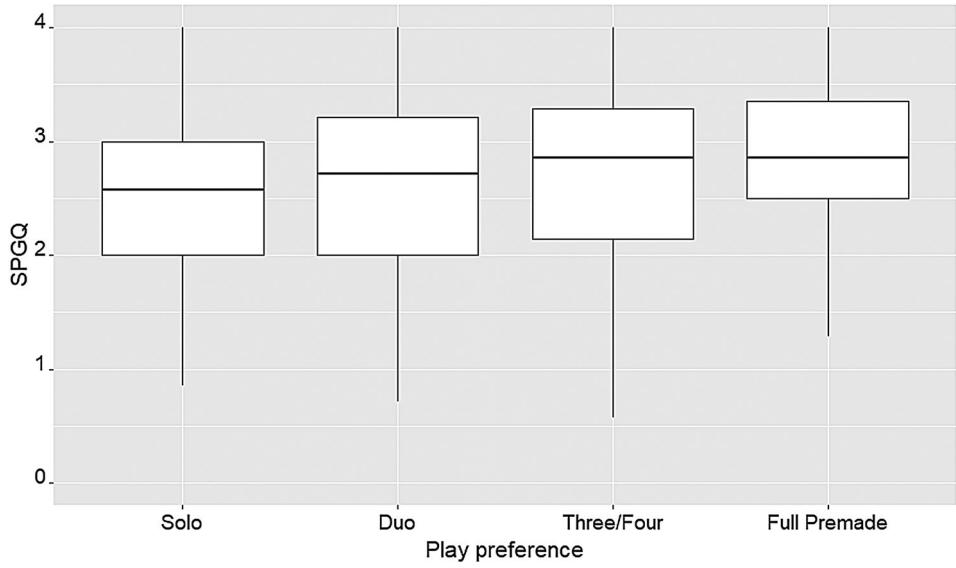

Figure 3. SPGQ as a function of player's team formation preference.

Table 4. Role distribution in the sample.

Role	*N*	Percentage
Top	64	15
Mid	81	18
Bot	97	22
Support	98	22
Jungle	66	15
Fill	33	8

Table 5. Kruskal-Wallis and Dunn's test results for PENS dimensions grouped by Role.

Dimension	χ^2	*p*-Value
Competence	4.1686	.5254
Autonomy	13.977	.01575
Relatedness	3.5658	.6135
Presence	10.969	.052
Controls	12.428	.02937
More > Less	*z*	Adj. *p*-value
AUTONOMY		
Mid > Jungle	3.143	.025
CONTROLS		
Mid > Bot	2.973	.044

Their extra feeling of autonomy could be explained for their central position in the map, leading to more courses of action available for Mid players, while other roles such as Jungle spend their time going over their optimal routes in the Jungle (leaving little space to exploration). Furthermore, in the case of professional teams, good Mid players are usually considered as 'mechanically gifted' (meaning their level of competence with the controls is extraordinary as they need to react in fractions of a second) but our sample didn't include professional players and, therefore, we are not able to relate mechanically gifted players to Mid.

SPGQ results displayed no statistically significant differences in neither empathy, nor negative feelings, nor behavioural engagement, with *p*-values over .65. Players' social presence seems to be, therefore, unaffected by the role played within the team.

6. Discussion

Here we attempt to provide a broader look at the results of each research question beyond the findings reported in the previous section.

> (RQ1) Higher ranked players feel more confident on their competence level.

As players climb the ladder they apparently become more confident than other players and assess their competence level as more appropriate to the challenges of the game than their lower ranked counterparts. Empathy and negative feelings toward other teammates seem to be, however, not related to their ranks or skill levels.

Therefore, players in *League of Legends* have a feeling of competence that is proportional to their in-game assigned level. Is this feeling of fairness what engages players? According to Smeddinck et al. (2016), getting the level of challenge to match the capabilities and needs of a player is a core element of good PE. In the case of competitive FPS, differences in skill levels affect enjoyment: weaker players become frustrated and stronger players become less engaged (Vicencio-Moreira, Mandryk, and Gutwin 2015), so balance is key. According to the obtained results, the *League of Legends* ranking system seems to balance perceived skill levels fairly accurately. Przybylski et al. (2014) linked perceived competence to 'a behaviorally measured motivation to play a game'. This was corroborated by Neys, Jansz, and Tan

(2014) who found an additional insight: this was truer for 'hardcore gamers' over less frequent gamers. It is possible, thus, that ranked players in *League of Legends* could be considered 'hardcore gamers' with an accurate feeling of competence that drives their motivation to keep playing.

(RQ2) In our sample, whether players decide to enter the game alone or together with different numbers of friends doesn't show significant impact in the PENS dimensions for League of Legends. It's worth noting that our sample is purely composed of ranked players, and competitive players tend to value play-focused attributes over social characteristics. Results might be different if we had been able to include non-ranked (amateur) players or other game modes. A qualitative study by Vella et al. (2016) explored social play and found that 'social play as a whole tended to generate enjoyable experiences of challenge and competence, teamwork, and connection with others'. In spite of this, people who played with known others prioritised feelings of connection and social interaction (and, therefore, relatedness) while playing with strangers 'produced great convenience and autonomy in gameplay, as well as experiences of challenge and competence' (Vella et al. 2016). Such differences were not present in our study, so MOBA games might display differences versus other genres. *Positively toned emotions toward co-players*, however, *are significantly higher for full premade teams* (so, teams composed by friends) than they are for players that enter the game 'solo' (therefore, playing with four strangers). This represents a quantitative confirmation of what has been reported by previous studies. Although people prefer to play with people they already know, the SPGQ results also show that negative feelings directed to known teammates are no different than the ones directed to unfamiliar players.

This unexpected result calls for additional research. It might be natural to observe higher empathy in teams composed by friends, but it would also be expected to observe lower levels of negative feelings. Results show otherwise; why negative feelings are equally observed among friends as they are among total strangers? Is this common to all online competitive games or is it particularly relevant on team-based MOBA games? The exploration of negative emotions by Bopp, Mekler, and Opwis (2016) showed how 'players did value their experience not in spite of negative emotions, but actually thanks to the game inspiring strong emotional reactions'. Would it be possible for the strong negative feelings of frustration to actually have a positive effect on engagement? While the collected data is unable to answer these questions, further studies should aim to understand this apparent contradiction.

(RQ3) *Different player roles*, however, *could bring different player experiences with them*. The reason to check the impact of player roles was, initially, to understand whether Support players, for example, felt less autonomous as they are usually quite at the disposal of their team. Nevertheless, no such difference appeared in our sample. Only two small significant effects were found and pointed at the Mid role, that might present some singularities, namely a higher feeling of autonomy and control.

7. Conclusion

Overall, our research looks deeper into the particular PE and Social Presence that players feel in *League of Legends* as the most relevant example of a wider genre, MOBA games. Using our player sample, extracted using the database from the biggest eSports organisation in Spain (the LVP), we were able to explore *League of Legends*' PE.

We dove further into how PE differs across the game's player base to provide further insight for both future game design (and iteration) and future research. The first findings showed that, even when players perceive themselves as belonging to a higher rank tier, their perceived competence corresponds to their current rank, meaning that rank assignment in *League of Legends* could be seen as fair from a competence level point of view. Players' feelings toward teammates show no relevant differences across ranks. No marked differences were either found when looking at the impact of team play and role definition, which was, at first, somehow contradictory taking into account the highly social nature of *League of Legends*. However, further tests showed how team formation does seem to affect empathy (positive feelings) but have no apparent influence on negative feelings towards co-players.

In all cases, however, players perceive a similar level of interdependence. No matter what rank players are, what role they play or whom they play with, players know and feel that their actions are dependent on their teammates' actions as much as their co-players actions are affected by their own. This is invariant over the full experience and shows how players of all skill levels, roles and preferences know that, in order to win, team collaboration is essential. Not even the best players can win alone.

PE for ranked *League of Legends* show how competition is highly prioritised at the core while the most social aspects of the game (e.g. playing with friends) become secondary, making some audiences (e.g. social players) less confident or more uncomfortable, matters that could be addressed in further iterations of the game.

PE has proven to be beneficial in improving the quality of interaction between players and game software, as

it takes their emotions and perception into account, making it easier to influence its effects and thus providing a more pleasant experience to users. Knowledge about PE in *League of Legends* can not only be employed to improve *LoL* or MOBA games, but also to develop better and more engaging games while improving their quality.

In the end, PE is pivotal to engage players and, therefore, it is key to the success of any digital game. Knowing more about how PE is structured in the most successful online multiplayer game is a first step towards understanding the components that make it stand out. Other MOBA games could directly benefit from this knowledge, while other genres would need to adapt the resulting insights to their particular characteristics and needs. As online competitive gaming is quickly becoming one of the largest collective human activities globally, PE research is more crucial than ever.

8. Limitations and future work

The results explored in the current paper provide both confirmation of findings from previous studies and some insights into avenues for future research. Findings from our survey included a sufficient number of players to extract conclusions in the bronze to diamond ranks (basically amateur), but didn't have enough base to cover higher ranks (such as Master and Challenger, which are semi-professional to professional). Further research should also point directly to professional players playing (or working for) professional teams, players who play as work (getting paid for doing so) and whose PE could differ from that of those playing for enjoyment. On top of this, additional knowledge could be obtained by interviewing a relevant sample of players to further understand these insights and to detect existing shades or nuances on conclusions.

Team making and player preferences emerged as the area with the most potential (and need) for further research as, apparently and contrary to expectations, PE is not significantly impacted by them, which contradicts the highly social nature of *League of Legends*. The social presence tests, however, showed how at least a duality exists that would deserve further exploration. Team formation has significant impact on positive feelings towards teammates when they are friends but these friendships seem to have little influence when things don't go well: negative feelings arise just like they do with strangers.

For the current study, the PENS questionnaire (combined with SPGQ insights) was chosen because it is a test that has already been widely used and validated in previous works. As seen, however, there are multiple other options available that could have been used and could have brought additional validation to the obtained results. Future work could also include developing or adapting these general tests to the particular case and opportunity that MOBA games represent, with an explicit focus on the social component that they exhibit.

League of Legends, as many other online games, is regularly patched. Every two weeks, updates are rolled out, and while the core might be the same, gameplay is changed. How do players adapt to these changes and how is PE affected should be a question that should trigger interest to scientists and game designers alike. Studying how patching influences players and their behaviours could be influential not only to tune PE to the desired engagement levels but also to minimise their impact as users frequently complain (which might lead to abandoning the game) when these changes happen.

Last but not least, it has been suggested that tournament venues could bring additional insight to PE as they represent a singular research environment that has not been explored from the PE angle. *League of Legends* is often (if not always) represented in eSports tournaments and competitions, and teams that compete there are not only often premade but have also been playing together for longer periods of time. These venues offer, at the same time, a triple opportunity: the quantitative analysis of PE scales could be mixed with qualitative interviews or comments, while also keeping the raw authenticity of capturing the moment where players have just finished playing and their emotions are probably most exposed.

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