

Playing with Streakiness in Online Games: How Players Perceive and React to Winning and Losing Streaks in League of Legends

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ABSTRACT

Streakiness refers to observed tendency towards consecutive appearances of particular patterns. In video games, streakiness is oftentimes inevitable, where a player keeps winning or losing for a short period. However, the phenomenon remains understudied in present online game research. How do players perceive streakiness? How does it impact player experience (PX)? How should streakiness be taken into consideration for the design of PX? In this paper, we address these questions through a qualitative study of player discussions about streakiness in League of Legends. We found that players developed various ways to describe a streak. Both winning and losing streaks negatively impacted PX. Players devised numerous strategies to manage streakiness, among which disengagement was a primary means. We analyze streakiness as a social construct through which players coped with complex game systems. We discuss design implications for managing streakiness in online games.

Author Keywords

Streakiness; winning streak; losing streak; League of Legends; Multiplayer online battle arena (MOBA); player experience (PX); competitive online game; matchmaking.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Streakiness, which this paper defines as observed tendency towards consecutive appearances of particular patterns (such as wins or losses), is commonly observed and discussed in the literature on sports [2] and gambling [68]. While decades of research on streakiness remains inconclusive in the existence of such phenomenon and to

what extent it can be attributed to randomness [1,5,12,13,61], people themselves often make well-developed interpretations of this phenomenon and adjust their behaviors accordingly [12,68]. Superstitious practices might ensue after experiences with streaks: people fear that certain actions will wash away their good luck after a winning streak, but believe that certain actions will wash away bad luck after a losing streak [67].

Similar to sports and gambling, competitive online games involve win or loss and therefore contain winning or losing streaks as a natural component of player experience (PX). However, little game research in human-computer interaction (HCI) has considered the PX with streakiness in competitive online games. Since players' interpretation and explanation of achievement and failure significantly impact PX [19,34], it is important to understand how players make sense of streaks, and how streaks impact PX.

We studied streakiness in League of Legends (LoL) to answer three research questions: 1, what is considered a streak, 2, what causes streaks, and 3, how players react to streaks? We used content analysis to examine player discussions about streaks from two LoL-focused forums (i.e., the LoL boards and the LoL subreddit). We found that players used four factors (number of wins/losses, ranking score, time, and win rate) to determine whether they were experiencing streaks. Players developed various theories to explain streakiness, ranging from personal skill and in-game performance to the design of matchmaking system. Losing streaks negatively impacted PX and reduced player engagement. Players reported enjoying winning streak, but would also develop anxiety with the belief that a losing streak might ensue. Streakiness thus plays a critical role in PX. We consider how player discourses constructed streakiness through sensemaking, which refers to “*placement of items into frameworks, comprehending, redressing surprise, constructing meaning, interacting in pursuit of mutual understanding, and patterning*” [66]. Our contributions include bridging game research with streakiness studies in the sports and gambling literature, systematically documenting PX with streakiness, providing an in-depth analysis of the streakiness phenomenon in LoL, and deriving design implications from the perspective of sensemaking.

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LEAGUE OF LEGENDS

League of Legends (LoL) is a free-to-play multiplayer online battle arena (MOBA) game developed by Riot Games in Santa Monica, California. The game has more than 100 million monthly active players, according to a 2016 news report [54]. LoL is match-based; each match is played between two teams, each consisting of five players. A match typically lasts between 25 and 50 minutes. Prior to starting a match, each player chooses from nearly 140 champions, each of which has a unique set of abilities. The winning condition is that a team destroys the other's base or forces the latter to surrender. Figure 1 shows the beginning of a match, where a team of five players appeared at the lower-left corner of a map.



Figure 1. Screenshot of League of Legends.

LoL has two game modes: normal and ranked. Currently only the latter displays each player's rank using a league system. The league system contains seven leagues: Bronze, Silver, Gold, Platinum, Diamond, Master, and Challenger. Each league is further divided into five divisions, namely Division I to V. Each division contains 100 league points (lp). Players gain or lose lp when they win or lose a match. Upon reaching 100 lp in a division, they enter a promotion series, whose results will determine whether they can be promoted to the next division. Upon reaching 0 lp in a division, they risk being demoted upon the next loss. However, this visible player rank is merely a representation, and not used by LoL's matchmaking system. Instead, LoL's matchmaking system uses a numerical score, called matchmaking rating (MMR), to indicate a player's absolute skill level. MMR is hidden from players. The matchmaking system uses players' MMR to create matches between two teams of players. Details of the matchmaking system are not disclosed to players [25].

RELATED WORK

Player Experience in MOBA Games

Human-computer interaction (HCI) Researchers have identified several distinct characteristics of MOBA games. First, MOBA games foster a highly competitive player culture where players strive to improve their rank [35,42]. Johnson et al.' interview study with MOBA players found that two of the three most prominent themes are "competition is highly valued" and "satisfaction stems from

a sense of mastery" [35]. Kou et al.'s interview study found that LoL players' ranking practice shaped their skill-based identity and structured their social practices such as learning and collaboration. Second, teamwork in MOBA games is essential but also difficult to achieve [35,41,64]. This is because of the inherent difficulties in MOBA matches that expect five players who do not know each other beforehand to build efficient, seamless cooperation. In addition, research shows that under high pressure in game players easily develop aggressive behavior towards teammates when teamwork stumbles [41,43,60]. Lastly, researchers found that MOBA players need to develop many types of skills and expertise to succeed, such as mechanical skills as well as strategic vision [21], social and emotional skills [41,64].

Making Sense of Complex Computing Systems

Computing systems are becoming increasingly complex and opaque, creating much uncertainty between these systems and their users, either intentionally or unintentionally. As discrepancies often exist between user perceptions of technological systems and design intentions [32], users frequently engaged in sense-making activities to understand how complex systems work. Plausible explanations, the outcome of sense-making activities, played a role in directing users' interactions with these systems. Ample empirical work has found that people develop "folk theories" to explain complex socio-technical phenomena. Folk theory refers to "any non-technical, pre-scientific explanatory system of the world" [63]. For example, in studying how Facebook users explained the mechanisms of news needs curation algorithms [22], Eslami et al. reported 10 different folk theories that their participants developed and used to direct their news reading behavior. For another example, Arif et al. found that social media users developed folk explanations of how social media systems identify and correct misinformation [3].

Online games are complex systems with numerous invisible mechanisms that are critical to PX. For example, in LoL, five strangers are arranged in a temporary team to play a match together. While how these five strangers are matched together as a team significantly impacts teamwork as well as its outcome, little information has been disclosed regarding how the matchmaking system works. Left in the dark, players often need to rely upon their own to make sense of these hidden game mechanisms. "Theorycrafting" describes one of these sensemaking practices, defined as "the attempt to mathematically analyze game mechanics in order to gain a better understanding of the inner workings of the game" [36]. Theorycrafting allows players to optimize their gameplay tactics. Game-related forums have become places that support dedicated players to engage in theorycrafting practices and develop theories about how a video game works [11,36,52]. Building upon this research strand, we explore how LoL players make sense of winning and losing streaks.

Streakiness in Sports and Gambling

Sports and gambling are two distinctive human activities, but intersect at the topic of streakiness as human actors face complex situations with high uncertainty. Studies of streaks in sports in past decades have disagreed upon whether streakiness was a mere result of randomness in sports [5,13,27]. Yet players tend to develop various theories to explain such phenomenon, among which two widely discussed ones are the hot hand fallacy and the gambler's fallacy. The former means that a person who has experienced consecutive successes is more likely to win [26]. The latter indicates that a pattern that happens more (or less) frequently than normal will happen less (or more) frequently in the future [4]. Experiencing streaks impacts players' behavioral patterns in many ways such as decision making, confidence, and performance. Csapo et al. examined 1216 National Basketball Association (NBA) games and demonstrated that most players who experienced hot streaks were more likely to attempt more difficult shots with no significant decrease in shooting accuracy [16].

Gambling studies tend to focus on the psychological ramifications of gambling in terms of problem gambling [56], stigma [31], and disorder [39]. Within such discourse, previous research on streaks in gambling has focused upon the somewhat stigmatized human reasoning and behavior associated with streaks. For example, Rogers listed various biases and irrational thinking patterns in lottery play, such as the misunderstanding of lottery odds, a belief in hot and cold numbers, a belief in personal luck, superstitious thinking, the illusion of control, the erroneous perception of near misses, and a susceptibility to prize size and rollover effects [57]. Griffiths and Bingham revealed that bingo players had developed various superstitious beliefs, such as not opening an umbrella indoors and not putting new shoes on a table [28]. Cummins et al. conducted two gambling experiments with college students to understand psychological effects of experiencing streaks, reporting that winning streaks could lead to reckless gambling [17].

Regardless of whether streakiness actually exists, increasingly more scholars have recognized the importance of studying people's subjective perception and experience of streaks [8,15], which are of value to understanding human cognitive and organizational behavior. Particularly, LoL presents a unique scenario combining the team-based competitive experience similar to sports, and the chance-based arrangement of teammates similar to gambling.

METHODS

Data Collection

To investigate how players experienced streaks, we chose to focus on two LoL-related forums: LoL's official forum and the '/r/leagueoflegends' subreddit. We chose the former because the forum is a default place for LoL player's discussions. We selected the latter one because Reddit is the largest online forum and this subreddit is popular among LoL players with more than one million subscribers. We

used keyword "streak" as the criterion to collect relevant threads from both forums. This study belongs to the project that investigates player experience and collaboration in LoL, which has been approved by the university institutional review board. By August 20, 2017 we collected 300 threads with 1409 comments from the official forum, and 473 threads with 16483 comments from the subreddit. We combined them into one dataset for data analysis.

Data Analysis

The authors used content analysis [44] to examine our final dataset of 773 forum threads. For each of the three research questions, we followed the following steps to perform data analysis. We first randomly selected 12 threads with their associated 373 comments with consideration of number of comments and date. Each of the four coders adopted the open coding process to code this sample set individually. All the coders then met and discussed their identified codes, generating an initial codebook. We then randomly selected a second set of 10 threads with their associated 247 comments. Each of the four coders used the codebook to code the second sample set, remaining sensitive to emerging themes. After the second-round coding, all the coders met again to compare their coding results. We used the Cohen's Kappa coefficient to calculate the average inter-rater agreement scores [29]. We found that our agreements were satisfactory for the first two questions, and moderate for the third question (0.67, 0.63, and 0.58). We then discussed to resolve our disagreements within the second set. The final codebook is:

What is considered a streak: number of matches; time, change in player rank, and win rate.

What causes a streak: individual skill, mentality, teammates, randomness, and system design.

How do players react to streaks: negative emotion, mentality control, quitting, improve skill, and folk strategies.

Using the final codebook, each of the four coders coded an additional randomly sampled 1000 records (posts + comments) for the three research questions. We combined our final coding results ($n = 4620$; 3493 from the subreddit and 1127 from the official forum) and calculated the percentages for each research question. We consider 94% of our data related to PX, excluding player comments that were primarily functional without new content (e.g., "good post"). Sufficient knowledge about LoL and the general player culture is the basis for interpreting and analyzing the data. All the authors play video games on a regular basis; the first and third authors are familiar with LoL; and the first author has played the game since 2011 and ranks at Platinum. We paraphrased quotes to reduce their searchability and reduce potential risks to players use nicknames in online discussions (see [49]). When reporting data, we use pseudonyms for each unique forum nickname: R+number for the subreddit (e.g., r1, r2, r3, ...), and O+number for the official forum (e.g., o1, o2, o3, ...).

FINDINGS

LoL players made sense of their streaks by developing explanations regarding what they considered as a streak, what might be the causes, and what strategies could mitigate the negative consequences of streaks.

What is Considered a Streak?

In this section, we discuss what items players put into a framework in defining their experienced streaks. Players described their experienced streaks using the number of consecutive wins or losses (62%), sudden change in their rank (36%), time (mostly described in days) of experiencing only wins or losses (15%), and their imbalanced win rate (2%). Below we describe these four ways in detail. Note that their total is larger than 100% because these four ways are not mutually exclusive as people might combine several ways in their description.

Number of Matches

We observed that the most frequent way players described their streaks was to use the number of matches that they won or lost in a row. A player wrote on Reddit:

I have lost 23 games in a row after the patch was live and it's pretty much reached the point where I would stop playing the game very soon. [R1]

In addition, many players noticed that losing streak and winning streak were often adjacent in time. A player noted:

Sometimes I notice in my history that 10-15 consecutive wins were followed by 20 consecutive stomps. [O1]

In this quote, stomp means defeat. What this player noticed was that a winning streak was immediately followed by a losing streak.

Figure 2 shows the distribution of streak lengths mentioned by LoL players, which ranged from 2 to 69, but mostly between 2 and 14

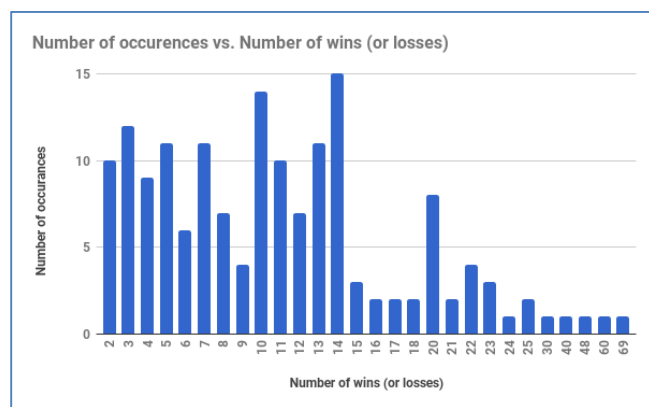


Figure 2. Distribution of length of streaks described by players.

Change in Rank

Players described streaks is their observation of drastic increases or decreases in their rank. For example, in 2012 when LoL still used the Elo system, a popular method of

calculating player relative skill level, to show player rank, players described streaks using their Elo ratings:

I dropped from 1360 to 890. No way to crawl out of the pit. [R2]

In this quote, 1360 in the Elo system in 2012 is similar to Silver IV in the 2017 league system, and 890 is around Bronze IV. After LoL implemented the new ranking system, the league system, players started describing their streaks using references to the new ranking system:

The 1st time I had a massive loss streak, I went from a Gold V promotion series all the way down to Silver III. [R3]

I once experienced an 11 or 12 losing streak in Ranked about a month ago. I went from Plat III to Plat V. [O2]

Time

Players also described the period of time during which they only experienced either wins or losses. Here is an example:

I'm getting tilted a little... 3 days without a single win... no matter how hard I try, no matter if I...[R4]

Tilt, or tilted, refers to a declining mental state in conducting the same activities, resulting in more and more negative results. In this example, the player described how they failed to achieve a single win in three days. The player also had the feeling of helplessness as they lost control of their progress in game. The same sentiment was echoed on the official forum:

I recently got a huge losing streak in ranked games over several days, where if I wasn't "feeling it" I'd rather stop playing or play a normal, and not play ranked unless I won, but still lost quite a bit when I got my attitude right and went back into ranked. [O3]

In this example, the player described their perceived losing streak in terms of the number of days. The player also indicated that they might be negatively influenced by the losing streak so they had to adjust their feeling.

Win Rate

The last, and least frequent way people described their perceived streakiness is their win rate which they deemed imbalanced (when it deviated a lot from 50%). An example is:

I reached gold last season but this season because of crap placements I was put in b3. In the way coming out of Bronze I had like a 65-70% win rate until Riot decided that was too high for me. [O4]

B3 is short for Bronze III. Placements are the first ten matches in a new season that will significantly impact players' ranks. Poor win rate in placements in this example pushed player O4 from Gold to Bronze III. O4 then experienced a winning streak with an unusually high win rate that allow himself or herself to "come out" of low rank. However, O4 believed that this high win rate would not last,

because the matchmaking system is designed to create a 50% win rate for every player.

What Causes a Streak?

Players engaged in long conversations to develop plausible explanations about the causes of streaks. Players frequently cited individual and social factors and game design as primary causes. Individual factors included individual performance (20%), individual mentality (45%), and teammates' performance (12%). Game design contains randomness of complex system (11%) and design of matchmaking (33%).

Individual Factor: Performance

A few players tended to attribute streaks to individual players' skills. It seemed to them that the ability of the player to perform well or badly in game was the primary cause for having a winning or losing streak. For example, a player reflected upon the role of individual performance in the outcome of a match:

I'm sure it is possible to carry average teams if you are better than the opponent on your same role. Don't go support tho unless you play Malz/Zyra/Sona/Karma. [O5]

The player suggested that individual performance could influence the match result. On the official forum, players' forum nicknames are the same as their game accounts, whose match history is visible. Therefore, when a player described their experienced streaks, other players could check the claimed streaks and analyze what caused these streaks. In the following example, player1 experienced a losing streak and sought help:

Player1: *I lost 6 games in a row, and went from Sliver IV to Sliver V. Some games I admit I play bad; but others I do good but still lose. Any suggestion would be nice [O6].*

Player2: *I checked your match history I notice that your itemization is horrible and you can't decide on what to build. Often you stopped building one item to get parts for another... [O7]*

In this conversation, player2 closely examined player1's match history such as purchased items and scores to explain why player1 had experienced losses. Player2 found player1's individual performance to be a major reason behind the latter's losing streak.

Individual Factor: Mentality

Players perceived strong associations between losing streaks and negative mentality, and many found that losing streaks caused a negative mentality, which in turn lowered player performance in game. In this example, player2 explained why player1 was having a losing streak:

Player1: *I was P3 at 87 LP, dropped to G2 with 13 consecutive losses. I know I am playing angry so I am not playing as well as usual... [R5]*

Player2: *If you want to keep playing league... then play normal games until you start winning games again and*

realize that you are the biggest reason in losing every single one of those games. [R6]

In this example, player1 sought help on Reddit regarding their losing streak and their associated negative attitude. Player2 frankly pointed out that player1 must fix their attitudinal issues before continuing ranked games. Another player noticed how attitudes might change when players experienced streaks:

It's quite random but it is entirely possible to lose subsequent games that you play in a short amount of time but mostly because your attitude changes and carries over from game to game. Note that people are already at a disadvantage when they get matched with someone with a poor match history recently since they'll be mad at the person. [O8]

Players carried on lots of efforts and expectations in competitive gaming, but ended up losing one game after another. Negative emotions such as tilt were a routine experience within the LoL community. Here a player succinctly described this routineness of tilt:

This is called tilt. It is a disease that no one knows how to cure. Every professional player gets it as well. :P just comes and goes [O9]

Individual Factor: Teammates' Performance

Players also pointed to the chance-based team arranging system, where they had to team up with teammates who had poor performance. A player complained that:

Right before posting this, I just had 4 games of bot/autofill trollers in a row. Of course the adc or supp player will do badly if their partner feeds 3 kills before 5 min. [O10]

The player blamed their losing streak on teammates that they perceived as toxic, meaning flaming, trolling, or griefing in game.

Other times, they encountered the superior performance of a single teammate or opponent single-handedly determining the match result, which supplied them little sense of control over the game. For example, a player complained that:

Since people are allowed to open smurf accounts, it's really easy to leave the game... you can have 3 of your teammates being tyler1 wannabees, then you got the players running League of Windows 95 with 400 ping (aka SamB). [O11]

In this quote, smurf refers to the new accounts that highly skilled players such as professionals create. Because the accounts are new, the matchmaking system does not recognize the players' true skill level but instead pits these smurfs against new players or lower-rank players. Therefore, these smurfs can exert powerful influence over a match. In this quote, the player described a phenomenon that either smurfs or completely new players are placed on

his or her team, thus played a critical role in causing streakiness.

Beneath this attribution of losing streaks to teammates was players' dissatisfaction with the game design of LoL. Players were complaining about being matched with toxic teammates or smurfs in consecutive games.

Game Design: System Randomness

Players also sought to explain streakiness drawing from their understanding of basics of probability theory. For example, a player drew an analogy between the occurrences of streaks and flipping a coin:

If you flip a coin 1000 times, you'll very likely have some streaks. [O12]

Another player explained that:

Long losing streaks could just be bad luck, or regression to the mean particularly when you just had a huge winning streak lately. [R7]

These explanations attempted to explain streakiness as the inherent characteristic of any sequences. However, more players believed that probability alone could not fully explain their experiences with streakiness. They turned their attention to the game design of LoL's matchmaking system.

Game Design: Matchmaking

Some players began to question the design intention of LoL's matchmaking system. For example, one player wrote:

Riot's crappy MMR system basically works like this: Winning streak means your MMR is boosted; Boosted MMR gives you same allies, harder enemies; Same allies, harder enemies means Losing streak; Losing streak sends you go back where you started; [R8]

In this quote, the player was mimicking what the matchmaking system might be "thinking" when arranging matches for him or her. Boosted refers to the activity that a low-skilled player asks another high-skilled player to play on their account and improve its rank beyond the former's skill level. This activity violates the Terms of Service of LoL. But the player only used "boosted" in an ironic way. The real meaning of this utterance is that the MMR system thinks that a player's actual skill level does not deserve the player's rank. When the MMR system starts to think so, it challenges the player with "harder enemies."

Other players attempted to explain the design principles of the matchmaking system. For example, a player referred to what a LoL designer once said to explain how the matchmaking system might work:

...I remember a reddit post earlier more than a year ago where some rioter had explained how matchmaking works and literally he said matchmaking tries to arrange in the same team two people on a win streak and two people on a loss streak. [R9]

Another player attempted to draw from another game to explain how general matchmaking systems work:

Blizzard said in Overwatch they tried to break losing streaks by intentionally putting players against worse opponents when they're on losing streak. <http://us.battle.net/forums/en/overwatch/topic/20742904212#10> [R10]

Overwatch is an online game developed and published by Blizzard Entertainment. In these discussions, players began to gather evidences to make sense of the link between matchmaking design and streaks. They agreed that matchmaking systems created the phenomenon of streakiness on purpose.

Why would matchmaking systems intentionally create streaks? Players reasoned that the primary purpose of the matchmaking system is to guarantee a roughly 50% win rate for each player. Therefore, to these players, the matchmaking system is never intended to create a match in which either side has a 50% chance to win. Rather, it might create imbalanced matches on purpose to control each player's overall win rate. Such matchmaking design can thus easily cause streaks. We have observed numerous player statements that reflected this belief:

The better you get, the harder the opponents and more retarded your teammates. Riot really wants you to stay at 50% winrate [R11]

Riot's equation says you can't have above a 50% win rate. When you do, you will team up with people who have terrible win rates (20-40% typically). [O13]

Riot tries to force a 50% W/L ratio until eventually you get your rank, instead of forcing equal rank in your matchmaking until eventually you reach 50% W/L. This means works too, because eventually you will climb if you deserve that rank, it will not stuck you nor anything, BUT it will take you WAY WAY WAY more games to reach your actual rank, whatever it is. [O14]

This explanation well matched players' streakiness experience, and fueled lots of grievances among players against the matchmaking system, and Riot Games in general. For example, a player said that:

The matchmaking system forced a wonderful 50% win ratio to everyone regardless of their performance or the number of games played. (irony off). In a winning streak you win even if you just troll. In a losing streak you lose even if you do very well. This game can go hell. [O14]

Clearly, the player perceived that certain game design as unfair against players. Other players even began to speculate about the malicious intention of Riot Games in manipulating the matchmaking system to create negative PX. For example, a player thought that Riot Games were against himself or herself:

I believe Riot has a vendetta against me and matches me up with bad players for a week on purpose. Damn you caught them! It's ONLY you who has this, it's NEVER the other team who has it, just you [R12]

Another player described their theory about how Riot Games wanted to cover up its malicious purpose within its matchmaking system:

A rioter even said Riot wants you to stay at around a 50% win rate, and then he got fired. So like you are wrong!? [O15]

Some other players developed more complicated explanations of streaks combining both individual factors and matchmaking design. A player said:

You win a game you feel happy... You play well one game you're likely to play well the next. You're directly making your games correlated which makes these streaks much more likely. In addition, the matchmaking system sort of encourages these streaks even if not on purpose. You win a few in a row (the last few maybe you get carried) and your MMR goes above what you deserve. Now the system thinks you're not as good as your opponents and you lose a few in a row... [O16]

How do Players React to Streaks?

Streaks, as players described, were common in their game experience. They needed to cope with streaks on a regular basis. Our data shows various types of player reactions towards streaks, ranging from emotional to strategic. Among all the expressions where players articulated their reactions, 57% expressed negative emotions, 35% described quitting LoL for varying ranges of time, 76% described mentality control as an important coping strategy, and about 14% described various folk strategies.

Negative Emotions

Unsurprisingly, many players described their negative emotions associated with losing streaks, which many quotes in previous sections already suggested. For example, players described their frustration on Reddit:

Long losing streak with such painful and annoying games does not really motivate you to keep playing. [R13]

They create a system that can be extremely frustrating for someone and then they coddle people. They don't even ever learn to deal with stress. Sounds like a bad idea to me. [R14]

Similar sentiments were expressed on the official forum. A player wrote that:

These streaks are so predictable. I can easily see when they going to start which gives me a massive anxiety. [O17]

However, winning streaks did not relieve players, and could cause negative emotions too. A player explained that:

I'm just really tired of winning streaks after losing streaks after winning streaks. It's annoying and not fun. And, in a winning streak where I win effortlessly, I lose every motivation to continue playing, first because I don't feel that I deserve some of those wins, and second because I know a losing streak is about to happen. It is just about to hit me like truck, and that's NOT fun. [O14]

The player reasoned that even winning streaks are not fun when the player felt they did not contribute enough and anticipated a follow-up losing streak as a regular experience. Another player also expressed discontent with winning streaks, but for another reason:

So I reached lvl 30 in League and decided to play some solo/duo in ranked. After 8 games I was promoted to gold III for absolutely no reason, I was confused. Some players told me it's because of win streaks that I had and the game itself got a lot harder... Please don't place news players in gold just because they got a win streak, and this may sound weird, but I had enough of people calling me noob and other offensive words, and if it's possible could I be placed back to placements. Thank you. [O18]

This player experienced a losing streak which placed them at a rank that did not match their actual skill. This situation caused in-team conflicts between the player and their teammates, who had certain expectations of performance from the former.

When LoL players tried to make sense of streakiness, they regarded winning and losing streaks as two integral components of streakiness, rather than two opposites. Most player discussions mentioned winning and losing streaks together in negative tones. Negative emotions that LoL players mentioned after experiencing streaks, mostly losing ones, can be classified based on a tree-structured list by Shaver et al. [59]. The primary emotions are anger, sadness, and fear, which further point to several secondary emotions (see Table 1). Detailed psycholinguistic analysis of these negative emotions is out of scope but promising in future work.

Primary	Secondary	Actual words used by players
Anger	Irritability	Irritated, tilt, tilted, grumpy
	Exasperation	Frustration, frustrated
	Rage	Angered, angry, salty, mad, flame, insane
Sadness	Sadness	Depression, despair, misery
Fear	Horror	Fear, cry
	Nervousness	Anxiety, stress, troubling

Table 1. Types of negative emotions mentioned by LoL players.

Quitting

When gaming experienced caused negative emotions, players wanted to manage such negative emotions in ways that might be deemed undesirable by game companies. For example, many players described quitting LoL for a period of time ranging from days to years:

I lost 12 games including ARAMs. After that I quit the game for a little over a year. [R15]

I just quit for a week or so cause of frustration. Now I take a more relaxed approach to League in general. [O2]

My longest ever was 69... Then I quit for a year and a half after that... I did go insane, I am again on a 20 ish losing streak now [O19]

The nature of our data prevents us from knowing the precise description of timespans that players quitted for. Rather, we noticed that players often used vague language such as “a while,” “about two months,” and “over a year.”

Mentality Control

More players recognized that streaks are a reality of their game experience, and to improve ranks, they must take advantage of what they knew about streaks and develop coping strategies. The most common one is to manage one’s own mentality while playing LoL. “Taking a break” was a common strategy, and appeared 498 times in our dataset. Here are a few ways that players took “a break,” such as not playing LoL for a while and playing another different game:

I took a break and started playingSCII [StarCraft II]. It’s really chilling :) [R16]

Take a break or eat something. Go workout or watch a movie... Just stop playing for a few hours. [R17]

Players stressed that one must make sure they had a positive mentality before starting to play ranked games again. players wrote:

Before starting ranked for the first time, if you feel stressed, play a normal draft game like a distressor or a warmup for the next game [O20]

Improving Skill

Corresponding to one of the perceived primary causes as poor individual performance, players discussed how to improve individual skills to break a losing streak. The identified individual skills included both personal gameplay expertise as well as social skills to cheer teammates. For example, a player wrote about improving individual performance in game that:

Practice your basic skills in non-ranked games - like last hitting, lane freezing and occasionally getting in a poke on the other champ while last hitting. [O21]

Last hitting refers to landing a killing blow on an enemy minion which awards experience and gold. Lane freezing refers to maintaining the frontline where minions from two

sides meet and fight. Poke means to cause damage upon enemy champions from range while remain safe. Some players talked about the importance of constructive communication with teammates, especially when they performed badly. In the following two examples, feeding means being killed repeatedly.

This is probably the hardest part of the game. How do we not flame at feeders/unskilled players? We have to be patient with them, and try to help them. We should encourage those who are bad at the game, and we should work with feeders so that they don’t feed and play safely, although they will most likely talk back saying things like, “they tower dive me every time!” [O22]

just convert “stop feeding” to “hey guys, can you be a little bit more aware of your surroundings” [O23]

Folk Strategies

Players developed four strategies to cope with streaks. “Folk strategy” to refer to player strategies that were generated based on their perception of how the game works. A formal assessment of these strategies is out of the scope of this study, but is achievable via a large-scale analysis of LoL players’ match history that can be retrieved through LoL’s API. The four strategies are:

Taking advantage of the hot hand was proposed most frequently among player mentions of folk strategies (71%), based on the perception that a player who was already on a winning/losing streak was more likely to win/lose the next match. Here is an example:

You can stop or keep going if you win three in a row until you lose your first game. Some people keep playing if they get hot, while I usually just like to call it a day. [O24]

Picking overpowered champions was the second most frequent strategy (20%). Players perceived a lack of game balance in LoL, resulting in some champions being much stronger than others. Here is a conversation excerpt:

Player1: *Yep, and the only way to win these is to play Riot’s special retarded pool of op champions.... [O25]*

Player2: *absolutely agreed ... I will spam Yi till I get plat [O26]*

The two players agreed that playing certain champions could give them particular advantages in game.

Timing of play could be a factor too (8%). We observed several discussions where players believed that they had a better chance to win if they chose certain time range to play. Players wrote that:

Different hours matter. I like to play in the morning because there are better players. At least for me, I don’t get stupid people or trolls :) [R18]

Don’t play during the popular gaming times, and play during more obscure hours, which can generally increase the skill of your teammates. [O27]

Superstitious strategy also came into play (1%) when players associated breaking a streak with specific artifacts or behaviors. Here is an example:

Connect your mouse into a different USB port... Drink an energy drink; Works for me every time [R19]

In this quote, the player implied how the mouse might impact the match result.

DISCUSSION

In this paper, we reported on a qualitative content analysis of how LoL players perceived and reacted to streaks. We demonstrated that, although streaks appeared as merely consecutive wins or losses, they triggered dramatic and intense feelings and reactions. The various ways of describing a streak indicate that players paid much attention to experienced streaks, manifested in their cognitive work of memorizing number of wins/losses, change in rank, number of days, and win rate. Their wide range of explanations of causes of streakiness showed their desire to understand the mechanisms of ranking and matchmaking systems. Player reactions painted a largely negative picture of PX with streakiness in LoL. All the negative expressions across our dataset suggest that both winning and losing streaks were hardly associated with enjoyment, a central component of PX [48]. Their coping strategies contained not only in-game mechanical skills and social skills identified by previous work [21,51,69], but also mental skills such as anxiety management.

Streakiness as a Social Construct in Player Experience

The paper was started with the definition of streakiness in terms of the mathematical observation of sequences. However, as our findings revealed later, streakiness is a complicated social phenomenon, in which satisfactory official explanations were missing, and players collectively developed seemingly plausible explanations. While Riot Games' official explanation reads that *"the system will attempt to assemble two teams as fairly as possible to create a game wherein both teams have an equal chance of winning"* [25], some players believed that the matchmaking system disregards the balance of any single match, and manipulates each match in order to achieve an overall win rate of 50% for every player. It has become a lingering question among players as to how matchmaking is actually designed. While previous research on attribution has often pointed to the *self-serving bias* where people tend to attribute success to their own character but failure to external factors [7,19], our study revealed a nuanced picture where players did not simply view winning and losing streaks as success and failure. Rather, they attributed both winning and losing streaks to internal factors such as mentality, and external factors such as game design.

Collective sensemaking is an important player practice, especially when players encounter complex and opaque game mechanisms. Sensemaking takes place in situations of uncertainty [66]. Interacting with the complex game system

induces high uncertainty in many aspects. Uncertainty exists in the variety of player explanations of streakiness. Players could not form a consensus regarding the causes of streaks. Uncertainty also exists in players' mind because players often found themselves unable to control the result of their gameplay. Petralito et al. found that excessive difficulties can be enjoyable if players could form a positive experience such as learning and improvement, or sense of achievements and victories [53]. However, LoL players seemed to perceive streaks as overwhelming and unenjoyable, and could hardly derive feelings of improvement or sense of achievement. Multiple dimensions of uncertainty can easily lead to player anxiety, as our data shows. Even wins are not necessarily desirable.

Because of uncertainty and anxiety, players derived many thoughts and practices that appeared irrational at a first look. For example, some players thought that Riot Games caused frustrations with malicious purposes, which was similar to conspiracy theorizing [37]. Others proposed superstitious actions such as changing the USB port for the mouse in order to change luck. Such actions are similar to superstitious beliefs and actions among gamblers and athletes [6,9,28]. This "irrationality" counters the basic design assumptions of matchmaking systems that one number (MMR) encapsulates a player's actual skill level that players exhibit through serious, rational gaming. On the contrary, players could be emotional and irrational, especially when experiencing streaks, in making in-game decisions and dealing with match results.

Coping with Streakiness through Disengagement

Drawing from self-determination theory [58], Przybylski et al. argued that "both the appeal and well-being effects of video games are based in their potential to satisfy basic psychological needs for competence, autonomy, and relatedness" [55]. Iacovides et al.'s studies of gameplay breakdowns and breakthroughs also demonstrated that players' agency and involvement suffer if they do not feel responsible for progress or have meaningful impact [34]. In a similar vein, our study showed how players developed negative emotions from the sense of loss of control in interactions with the complex game systems.

A large portion of players' coping strategies relied upon disengagement, as disengagement could soothe their mood and break their losing streaks. Disengagement could take place at multiple levels. Players could disengage from ranked game mode and play only normal game mode; disengage from League of Legends, and play other video games; or disengage from video games, and carry out other forms of daily activities such as walking and eating. Players' active disengagement seems at odds with the goals of game design to enhance player retention, which in turn helps game companies' revenue [10,18,50]. However, it represents how players take care of their own psychological well-being when they recognized their negative emotions incurred by in-game conditions (i.e., streaks). Joining

research on the relationship between player wellbeing and video games [47,65,70], we point to the importance of self-care in managing player-game relationship.

Implications for MOBA Research

This study contributes to the body of MOBA research by reporting a detailed account of players' own narratives. Adopting an exploratory approach, this study belongs to the third paradigm of HCI that adopts the stance that *"meaning is constructed on the fly, often collaboratively, by people in specific contexts and situations, and therefore that interaction itself is an essential element in meaning construction"* [30]. Therefore, we put emphasis upon revealing how players developed situated knowledge about streaks as they interacted with LoL, and identifying the messy rather than principled player perceptions and reactions. The authors' domain knowledge about LoL played an important role in interpreting the LoL-related scenarios, players' reasoning, values, and desires, and the mechanisms of LoL. This approach was fruitful in reporting the nuanced, complicated PX with streakiness.

PX with streakiness is an important phenomenon sitting at the intersection of multiple distinctive features of MOBA games: a ranking system that measures players' individual skills based on their team-based match results, a matchmaking system that utilizes individual skill ratings to arrange a balanced match, and a temporary team of five strangers expected to develop smooth collaboration. Therefore, a better understanding of PX with streakiness can shed light on various MOBA research strands. For instance, the study speaks to a rising body of MOBA research that use models to analyze individual or team performance [38,40,46]. Our work suggests that streakiness experience may play a role in impacting their performance and cooperation with teammates.

Implications for Design

From the perspective of sensemaking, the streakiness discourse reported in this paper points to two layers of design implications. First, much research has recognized that computing systems that operate with big data and algorithms might generate biases that are not intended by system designers [23,24,45]. The explanations players collectively developed reflected their concerns about biases embedded in the matchmaking system (more likely to lose after having a winning streak). In this regard, it is important to investigate whether the hidden matchmaking algorithms contain hidden biases, focusing on not only the variables and processes of matchmaking systems, but also the actual results that players directly experience.

Second, even if streakiness originates mostly from players' subjective experiences and speculation, it still plays an important role in PX and shouldn't be taken lightly. From the perspective of design, game design can use positive interventions to mitigate the negative impact of streaks. For example, upon detecting losing streaks, games can employ methods to improve PX, such as dynamic difficulty

adjustment [33]. While matchmaking systems use a numerical score to measure player skill and generate matches, more information can be utilized to generate matches that players consider fair. For example, matchmaking systems should avoid arranging two teams which differ a lot in terms of match history or achievements (e.g., player ranks). Even if average MMRs are similar, players can still feel unfair if one team is full of newcomers while the other consists of old-timers. From the perspective of communication between designers and players, common ground seemed missing that could allow mutual understanding and shared knowledge between the two. The former can be more interactive in initiating conversations.

LIMITATIONS AND FUTURE WORK

This study relies upon forum discussions to reveal players' thoughts and practices related to streakiness. It is possible that not all players who encountered streaks would participate in forum discussions. Therefore, we do not claim that our findings can generalize to all the LoL players. We consider forum discussions' unique advantages compared to interviews and surveys. They are natural conversational contexts where players assume equal roles, an interlocutor, in opinion expression and reasoning processes. They are suitable venues to examine the socially constructed aspect of streakiness. The method has been widely adopted in many HCI topical areas such as crisis informatics and social movement to understand how people developed meanings of realities through online opinion expressions and discussions [14,20,62].

As an exploratory study, this research opens up new spaces for future research into the PX of MOBA. For example, more fine-grained analysis can be done using interviews to construct the belief system of players as a collective. There could be more detailed analysis of negative emotions associated with the PX of LoL. Another underexplored area is the association between player's perceived streakiness cause and their coping strategy. More research can look into the interrelationships between types of perceived causes, types of strategies, and player types.

CONCLUSION

In this paper, we studied PX with streakiness in League of Legends. Players did not perceive streakiness as a manifestation of system randomness. Our study of the two online forums revealed how they collectively developed various explanations and coping strategies which they claimed to be effective. By analyzing player online discussions as sensemaking, we highlight the socially constructed aspect of PX where players' own language and values are at play in interpreting, explaining, and enhancing their lived experience with gameplay. We call for more interpretive approaches in PX research.

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