Predictability in Competitive Video Games: Effects of Strategic Equilibrium on Player Agency

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ABSTRACT

This paper examines the instances of Nash Equilibrium in competitive video games focusing on its impact on player strategies and game dynamics within the context of *League of Legends*. By determining how Nash Equilibrium contributes to a phase of predictability that can both stabilize and stagnate the flow of the game through analysis of gameplay patterns and strategic choices, formulaic strategies between individual player agency and team objectives are revealed to negatively impact player engagement and spectator experience. Our findings prove that Nash Equilibrium has significant concern for game design, requiring adjustments that improve strategic diversity without endangering the competitive integrity of the game. With the study's insight into the relationship between player behavior and game mechanics, we aim to offer a valuable addition to the growing field of game theory in esports.

Keywords

Competitive Games, Game Theory, Nash Equilibrium, Game Design, Player Agency

INTRODUCTION

In 2018, a professional match in *League of Legends* (Riot Games, 2009) in South Korea set a record for the longest competitive match without a kill at 39 minutes (LoL Esports, 2018). This match showcased tremendous restraint from the players, as matches in this competitive scene are typically characterized by intense action. However, the audible reactions from the audience and conversations among the casters during the match revealed that these prolonged lulls were unstimulating, spiritless, and ultimately, boring. These observations highlight a tension between player agency which means "the feeling of empowerment that comes from being able

to take actions in the world whose effects relate to the player's intentions" (Mateas, 2001) and the overarching objectives set by game mechanics, which often steers team behavior towards specific goals.

While such competitors represent a small minority of the player base, supporting the competitive scene is necessary as it serves several purposes that benefit the game's community (Hamari & Sjöblom, 2017). Observations from other team esports titles and competitive matches have also highlighted that this issue can arise in various games within the genre. While prolonged lulls can sometimes be a valid tactical strategy for teams and may not occur every match, they are significant occurrences that can have substantial impact on player and viewer immersion, experience, and enjoyment. The strategic dynamics in team-based competitive games are extraordinarily complex, encompassing a range of elements that influence the decision-making process. Each game presents unique challenges and opportunities based on its rules and mechanics, producing diverse meaningful choices that result in a deeper game (Salen & Zimmerman, 2004, 33). Understanding the factors that contribute to these downtimes will provide a comprehensive awareness to game designers on how to prevent this obstacle in their titles.

This research aims to investigate and establish an effective guideline for game designers to consider as they review the strategic dynamic of their team-based competitive games, particularly focusing on the balance between player agency and game objectives. To support this study, we will connect the strategies used by the players with a concept widely accepted in the economics field of game theory. The use of game theory stems from the fact that throughout the duration of a match, the interactions between the teams are similar to that of the motivation behind economic decision making (Smith, 2006). Each and every action made by the players within the duration of the game is an investment towards the end goal of winning the game. A concept that best fits the reasoning behind the lulls in games is the Nash Equilibrium which will be discussed further.

Lastly, this study will focus exclusively on *League of Legends* as a case study to observe patterns that align with Nash Equilibrium occurrences. This selection is due to several key factors: the games significant impact on the esports industry, its substantial strategic depth, and the metagames that have been documented throughout the games history (Kokkinakis et al., 2021). By concentrating our focus on *League of Legends*, we aim to reveal how the game's unique structure contributes to the development of Nash Equilibrium, particularly through the lens of player agency. Our approach will allow for a meticulous analysis of specific gameplay elements and strategies that might not be as noticeable in other games. We hope to provide a unique understanding of the strategic interplay that defines the competitive gaming experience in *League of Legends* that can assist developers in creating more balanced and engaging competitive games.

MOTIVATION

The inspiration for this study emerged from watching various competitive esports matches and recognizing a trend between player behavior and game flow. This pattern, where players optimize their conditions for the next team coordinated play by refraining from unnecessary solo actions, reflects a strategic depth crucial in team-based competitive gaming. Nevertheless, it also raises questions about the balance between individual agency and team objectives, as well as the impact of such

strategies on the overall pace and excitement of the game. These observations sparked our interest in exploring thoroughly into the strategic dynamics of team-based competitive games and examining how game design can influence player decision-making and gameplay experience.

Competitive video games, much like traditional sports, are played completely differently at the highest level of play. Casual players watching professionals play may find themselves mesmerized by the contrast in gameplay between their own experiences and those of the professionals. While understanding the professionals' decision-making processes may not always be essential for casual players, what ultimately matters is the viewing experience. Furthermore, there is a notable gap in the field of game studies regarding the intricate interplay between player behavior, strategic dynamics, and game design in team-based competitive games. Although there is extensive research on various aspects of game design and player experience, we aim to explore new perspectives, methodologies, and solutions that can enhance the overall experience of a competitive game.

NASH EQUILIBRIUM

Game studies is a multidisciplinary field that significantly benefits from a diverse range of approaches to understand the complexities of player behavior and game mechanics. Recognizing the appropriate theoretical framework to analyze the strategic interactions in competitive gaming is essential to this research. Game theory, particularly in the economic discipline, is applicable to this study as it mirrors the deliberate decision-making found in competitive games (Myerson, 1991). Among the abundant concepts that exist in game theory, Nash Equilibrium is particularly notable for its applicability in both competitive and cooperative environments. Introduced by John Nash in 1950, this principle has been pivotal in advancing our understanding of strategic interactions, where individuals act to maximize their own benefits, assuming others do the same (Nash, 1950). Nash Equilibrium occurs when each player's strategy is optimal, given the strategies of the others, thus preventing any player from having an incentive to deviate from their current strategy.

This research applies Nash Equilibrium to probe into the strategic dynamics that may potentially lead to stagnant or undesirable states in gameplay, focusing on how the tension between individual player agency and team-based objectives influences strategic decisions. The focus is particularly on how the tension between individual player agency and team-based objectives influences strategic decisions. Although Nash Equilibrium has extensive applications across various fields such as economics, political science, and biology, its core principles are instrumental in decoding the strategic nuances of player interactions within video games.

By focusing on the key aspects of Nash Equilibrium that influence team dynamics and strategic decision-making in competitive gaming, this study aims to rationalize how players' strategies can stabilize at an equilibrium that accommodates both coordination and competition. This perspective highlights how equilibrium conditions support mixed strategies, where players must constantly adapt to the changing decisions of others, leading to a dynamic yet balanced state. Such insights are crucial for understanding the interplay between individual actions and team objectives in competitive video games, offering a targeted examination of strategic equilibrium without delving into broader applications that extend beyond the gaming context (Devetag et al. 2014).

PLAYER AGENCY VS. OBJECTIVES

In competitive video games, significant tension exists between player agency and game-defined objectives that shape strategic outcomes. Player agency, defined as a player's ability to make meaningful decisions that glaringly impact the game's outcome, is a fundamental aspect of interactive experiences (Cole, 2018). However, as games become increasingly focused on objectives, the significance of player agency can diminish. This is particularly evident when Nash Equilibrium is achieved—players find that the most effective strategy revolves exclusively around objective-centric gameplay, reducing the value of alternative strategies that might express individual creativity/skill or divergent thinking.

As Cole discusses, while player agency extends beyond in-game decisions to include broader game interactions, its impact is most profoundly felt when players can see the tangible effects of their strategic choices. However, when games prioritize objectives to the extent that they prescribe specific strategies or paths to victory, the potential for players to experience genuine agency diminishes. This prescribed gameplay leads to a state where Nash Equilibrium is met when all participants align their strategies towards the most straightforward and objective-efficient approach, often at the expense of diverse tactical play.

The focus on objectives over agency can lead to gameplay where strategic diversity is stifled. Stang emphasizes that true agency arises not just from the ability to choose but from making decisions that carry weight and lead to distinct outcomes. In many competitive games, however, achieving objectives is so integral to success that deviations from the established strategic norm are seen not just as suboptimal but detrimental. This phenomenon is observed in scenarios where players repetitively execute the same strategies—an approach technically known as 'optimization'—which can ultimately lead to gameplay that feels predictable and unengaging (Muriel & Crawford, 2020).

To counteract this, game designers might consider integrating objectives that require varied strategies to achieve or designing game mechanics that reward innovative approaches to problem-solving. This would not only preserve player agency but also enrich the strategic depth of gameplay. Muriel and Crawford suggest that expanding the definition of what constitutes successful strategies could foster a richer environment where player decisions continue to have a profound impact on the game's direction and outcome.

Thus, understanding the balance between player agency and objectives through the lens of Nash Equilibrium provides crucial insights into game design. It highlights the challenges of designing competitive games that maintain strategic depth without sacrificing the player's ability to make meaningful choices. The goal is to create games where player agency and objectives are not at odds but are instead components of a dynamic interplay that enhances the gaming experience for all participants.

METHOD

This section examines the occurrences of Nash Equilibrium within *League of Legends*. By examining specific instances when Nash Equilibrium is met, we aim to identify the overarching sensitivity between player agency and objectives. *League of Legends* is a cornerstone of the multiplayer online battle arena (MOBA) scene, and due to the

game's well-known strategic depth and gameplay mechanics, it makes an ideal subject for examining the ways in which Nash Equilibrium arises in dynamic, competitive, team-oriented conditions.

We conducted a case study with a detailed analysis within *League of Legends,* identifying specific gameplay scenarios where objectives dictate strategies leading to equilibrium states. Such situations typically involve converging optimal strategies where no player has an incentive to deviate, as it will not enhance their potential payoff. Game replays from professional matches, available as VODs (Video On Demand) on video sharing platforms like YouTube, serve as the primary data source. These replays encompass both regional and international tournaments across various years, providing a comprehensive data set for robust analysis. The inclusion of international tournaments, showcasing the highest level of play and strategic refinement, and regional competitions, reflecting diverse local gaming cultures, allows for a broad examination of strategic dynamics and their evolution.

LEAGUE OF LEGENDS

League of Legends is a MOBA where players are divided into two teams, each consisting of five players who control unique characters known as "champions", each with distinct abilities and roles. The primary objective of the game is to destroy the opposing team's "Nexus", a structure located at the base protected by defensive structures. The game provides attention to all the elements that real-time strategy games need such as team coordination and individual player skill. Our analysis of *League of Legends* and its gameplay will be exceptionally extensive from our experience of competing and viewing the game at a high level of play for several years. The duration of which we have actively participated in *League of Legends* is important for this analysis as we have seen the growth of the game along with many changes that shaped the game to what it is now.

DRAFT PHASE & METAGAMING

Before we start looking at the gameplay, we must look at the champion draft phase which sets the tone for the match. We will not discuss the complexities of drafting as it requires meticulous knowledge of the game and its metagame (Donaldson, 2017) which won't be required for this examination. Currently, there exists 167 champions in the game, for which only 10 are picked and 10 are banned each game. Even with the vast pool of available champions, not all of them are competitively viable as the game goes through new patches every other week that affects the effectiveness of certain champions, good or bad. Occasionally, some champions may become so dominant that they are considered essential in competitive play, dictating the drafting strategy, and influencing the overall approach to the game. An example of this occurring during a major competition is the World Championship in 2022 where the champion "Aatrox" had a staggering 100% presence, being picked 22 times with a win rate of 54.5% and banned 58 times (see Figure 1).
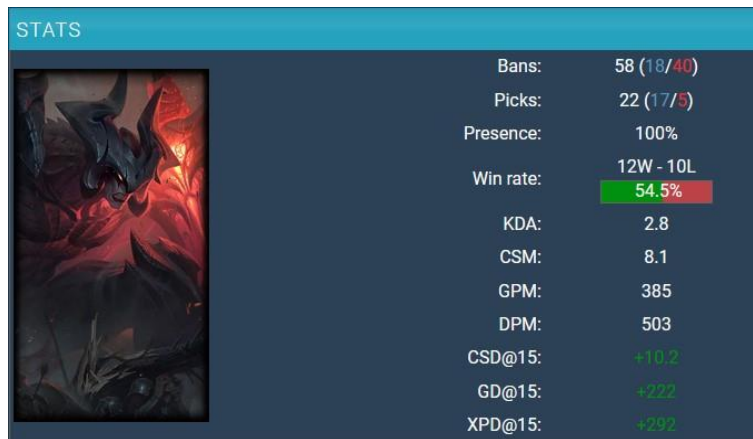
STATS		
	Bans:	58 (18/40)
	Picks:	22 (17/5)
	Presence:	100%
	Win rate:	12W - 10L 54.5%
	KDA:	2.8
	CSM:	8.1
	GPM:	385
	DPM:	503
	CSD@15:	+10.2
	GD@15:	+222
	XPD@15:	+292

Figure 1: Statistics of the champion Aatrox during the World Champion 2022.

When a champion receives this much attention, it creates a state of equilibrium. This situation limits strategic diversity as teams must either secure the champion to exploit its strengths or ban it to neutralize its impact. The emphasis on a single champion like Aatrox can lead to a predictable pattern of picks and bans that reflects a deeper underlying issue of players not having agency in what champion they want to play. While this is obviously intentional as not every champion can be strong at the same time, and competitors will opt for picking champions that give them the best chance of winning, outliers like this case can create staleness in the strategies.

Before we discuss the developer's opinion on this, it is crucial to keep in mind counter arguments for why dominant champions like this creating a known variable in the drafting phase is valuable to the strategic dynamic of the game. Every champion in LoL has their strengths and weaknesses and even the most prioritized pick like Aatrox has weaknesses. Historically, the main counter pick into Aatrox has been the champion Fiora. Therefore, if a team is certain that the opponent will pick Aatrox, they have the choice of not banning it and instead, picking Fiora and changing their strategy to dominate that matchup. Here is an example where this was done intentionally in the same tournament between the North American team Cloud9 (C9) and the Chinese team EDward Gaming (EDG).

Figure 2: Draft phase between Cloud9 (left) and EDward Gaming (right). Cloud9 picks Aatrox first, followed by a Fiora pick from EDward Gaming.

This deliberate strategy brings several strategic benefits to competitive gameplay and adds a new level of depth to the strategic dynamic to the game. Predictability allows for shifts in focus from choosing the strongest champion to developing a counter strategy that can effectively challenge the dominance. Additionally, it encourages players to demonstrate their skills in being able to execute different game plans revolving around specific strategies such as this counter pick. Game plans are created depending on the team draft and what they want to accomplish in different phases of the game. The game's pace is divided into three broad phases, early game, mid game, and late game, categorized by length of the game. Upon finishing the drafting phase, players discuss their approach to the game, but most specifically how they want to structure the first couple of minutes. In *League of Legends*, the first four minutes are significant as the actions made during this time set up the game plan for the teams for the majority of the game. This is majorly influenced by the team's draft which we will explain with the same match above as an example.

In *League of Legends*, there is one role that is unlike the others, "Jungle". Players in this role, called "junglers", are not tied to the three lanes and instead hunt monsters around the map and control the flow of the game. The monsters in the jungle are designed in a way that pushes these players to move around in a predictive pattern. By splitting the map into four quadrants, we can demonstrate how just by looking at the draft phase we can establish how the jungle player will move around the map in the first couple of minutes.
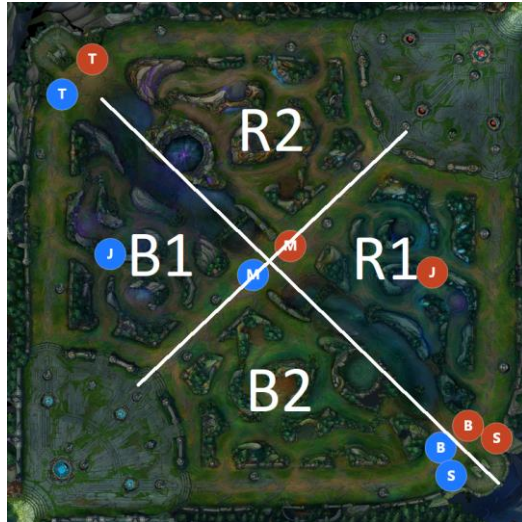
Figure 3: *League of Legends* map, Summoner's Rift, divided into 4 quadrants. B stands for blue side, R stands for red side, and 1 is where blue buff is while 2 is where red buff is (Lastowka, 2014).

Figure 4: Full draft of the match.

By simplifying the explanation, we hope to clearly describe the game's strategy at the highest level so those who have never seen a game of *League of Legends* can still comprehend the analysis. From the draft in Figure 4, C9 has a losing matchup in the top lane, while having a winning matchup in the bot lane. This encourages the jungler to navigate towards the bot lane to utilize their strengths and get a lead in the game. Meanwhile, EDG is the opposite with a winning matchup at top lane and losing matchup in the bot lane, which means that the jungler will play for the top lane. The C9 jungler will start from B2 and path towards B1 while EDG jungler goes the opposite direction from R1 to R2 (see Figure 3).

Figure 5: In-game picture of the match. Cloud9 jungler pathing down,
EDward Gaming jungler pathing up.

By examining Figure 5, we see that our analysis is correct with both junglers playing for their strong side. Now, what does this all mean? We can view this first couple of minutes as a set of objectives that all the players in the game are actively playing for with clear intentions that sets them in the best possible condition to win. Each player has their own objective that they cannot stray from as it will not grant them a higher chance of winning. For C9's case, this means that top lane must play safe, preserving their health, while bot lane looks for aggressive plays to set up for the jungler when they reach bot lane and vice-versa for EDG. These individual objectives combine to form a team-wide objective of playing to win, and if any player makes a mistake, it can negatively affect the entire game plan. In professional, blunders are detrimental as players are able to punish them harder. Nonetheless, when both teams understand each other's objective, it creates a state of equilibrium where each team's chance to win does not increase by changing the overall objective of their team. While having a clear strategic direction is crucial for team success in competitive environments, it is equally important for games to consider player agency during this stage. This period of the game, while seemingly structured, should ideally allow for some level of flexibility. Player agency in this context refers to the players' ability to make impactful decisions that may deviate from the standard strategy in response to in-game developments and opponent strategies. When player agency is restricted, the game can become overly deterministic, where the outcomes of engagements may be predicted based on the team's initial strategy without considering real-time decision-making or individual player innovation. This problem can not only reduce the enjoyment for the players themselves but also make the game less exciting for spectators who value unpredictability (Mutz & Wahnschaffe, 2016) and unique strategic twists. Moreover, overemphasis on strict adherence to predefined roles and strategies can stifle the development of players' skills in adapting to new challenges and learning to adjust strategies on the fly.

Predictability in the draft phase has been a topic of discussion in the community for several years with additions of new champions increasing the pool to choose from. Recently in 2022, Riot Games announced a fresh mode that combats this issue with the introduction of "Fearless Mode" (LPLfanclub, 2022). In this mode, all champions

picked by respective teams cannot be picked again by them for the rest of the series of best of three or five. This means that if team A picks Aatrox game 1, team A cannot pick Aatrox again for the remainder of the series. This mode saw its first usage in the *League of Legends* Development League (LDL), a second division competition in China and with its success, the North American Challengers League (NACL) which is North America's second division competition, also adopted this mode into their tournament (LoL Esports, 2024). Riot Games expressed its benefits for leagues that are focused on talent development of upcoming professionals as it forces players to have more diverse champion picks. What stands out from their article introducing the mode into NACL is when they discuss the results of this "makes each competitive game feel more dynamic and surprising". This directly supports the issues we highlighted of predictability damaging the player and viewer experience.

To summarize, our detailed analysis indicates the critical role of the draft phase in setting up early game strategies in *League of Legends* by illustrating how these strategic decisions can restrict player agency and lead to predictable gameplay. By focusing on specific matchups and jungle pathing, we demonstrated how teams establish structured strategies that maximize their chances of winning from playing early-game properly. However, this strategic inflexibility frequently results in a lack of adaptation, as players are forced into roles that restrict their capacity to make creative play and adaptability. Because of these predictable roles and actions due to a strong requirement to optimize their strategy, this might potentially stifle the spectator experience in addition to reducing player experience by limiting individual expression. It is vital that moving forward, game designers consider the mechanics that facilitate increased strategic flexibility and creativity, thereby enriching the competitive landscape and enhancing player agency.

NEUTRAL OBJECTIVES

In *League of Legends*, neutral objectives such as dragons, barons, buffs, and towers play a pivotal role in shaping the game's flow and heavily influencing the strategic decisions teams make. These objectives can often lead to a state of equilibrium where the teams' optimal strategies become predictable, revolving around either contesting or securing these objectives. While executing these objectives requires skill, the general goals across games remain consistent, which can limit the diversity of strategic gameplay diversity. In result, gameplay turns into a predictable rhythm where both teams mirror their efforts in securing objectives, leading to strategic equilibrium where the potential reward of the objective is not worth risking deviation from the strategy. Unlike a game of chess where players have all the information in front of them, *League of Legends* is a game of imperfect information as players don't always have information on everything the opponent has. The game mechanic "fog of war" hides parts of the map from each team, creating a layer of uncertainty that significantly impacts decision-making. Similar to traditional strategic games like poker, players must continually make predictions based on limited information. This adds a level of skill expression for the players and agency to make impactful decisions to victory.

Another layer of strategy in *League of Legends* is the vision game. Due to the fog of war, acquiring information of the opponent's whereabouts is immensely important as it communicates their intentions and strategies. There exist items in the game called "wards" that players can place near them that grant vision of the area for a duration. Placing these wards at the right spots could change the outcome of the game and

become an objective itself due to its potential impact. For example, if team A wants to make a play top lane but has no information or cannot predict where team B's jungler is, it becomes risky to make this play. Therefore, an objective for team A could be placing a ward in their bottom jungle to scout out where the jungler is, then make the play at top lane once they have enough information. In a game of imperfect information, obtaining information is pivotal for formulating effective strategies and reacting appropriately to enemy movements. Control over vision not only mitigates the risks associated with limited information but also strategically manipulates the opponent's perceptions and potential decisions.

The primary concern we've identified with the current strategic dynamic is the repetitive nature of the "give and take" strategy. When teams are cognizant of their opponents' actions, instead of directly contesting these moves, they often opt to compensate by securing alternative advantages. While this approach is undeniably effective, its habitual use leads to a predictable and monotonous game flow. A world record-setting competitive match was previously highlighted, where there were no eliminations until the 39-minute mark, exemplifying this issue. In this section, we will conduct a detailed analysis of this match to uncover the underlying flaws in the game design that enables such gameplay.

Since the introduction of *League of Legends* in esports, a South Korean team has won 8 world championship titles out of 13 being the most dominant region in the world. This results in eyes from all over the world looking at what the players are doing right that makes them so unstoppable. Studies have shown that this is due to the ease of accessibility of esports in South Korea with their rapid development of technology that sets them apart from the rest of the world (Kil & Yoo, 2017). This match is week 4, game 1 of the League of Legends Champions Korea (LCK), South Korea's primary competition, Jin Air (JAG) versus KING-ZONE (KZ).

First, what makes a zero-kill game by 39 minutes so spectacular is that the nature of the game manifests actions resulting in many takedowns and deaths around the map. To compare, the average kill per game during the 2018 spring LCK split was 18 kills / game. There are countless small factors that ensued to cause this, but the trend we notice is that rather than contesting the opponent's intentions for neutral objectives, teams opt for securing advantages elsewhere on the map, contributing to a low-conflict style of play. This strategy of "give and take" while strategic and healthy to the competitive nature, becomes problematic when it is so forgiving for the players to avoid contesting objectives.

The strategic avoidance observed in the Jin Air versus KING-ZONE match highlights a cautious approach where both teams prioritized map control and resource accumulation over aggressive maneuvers. This cautious approach is representative of a broader trend in high-level play where the risk of losing key players or resources can deter teams from initiating combat, especially when the stakes of losing an engagement potentially outweigh the immediate benefits of aggressive actions. The following images showcase the instances where a team decides to give the objective in trade for another resource.

Figure 6: (top) First dragon taken by JAG, KZ answers by going to the top lane. (bottom) Second dragon taken by KZ, JAG answers by going for KZ's jungle monsters.

The dragon is an objective that influences strategies heavily and both teams in this match utilized it as a pivot for their resource trade-offs. Dragons, when slain, grant the slaying team a permanent enhancement for the rest of the game depending on what type of dragon it is. These boosts to team stats are a luxury to have, but a team's strategy could revolve around completely ignoring this objective. This is due to how the strength of these dragon awards increases cumulatively and isn't fully realized until a team secures the "Dragon Soul" after defeating four dragons. Dragon Soul provides an exceptional bonus that has a lot more potential to change the outcome of the game. The rewards from individual dragons, while beneficial, may not drastically alter the immediate state of play or offer an overwhelming advantage to the team. During this patch, dragons respawn every six minutes starting at 2.5 minutes in game time, providing teams an opportunity to contest and securing these objectives at regular intervals throughout the match. However, the incremental nature of the reward means that it is more an investment towards the Dragon Soul and if we calculate the earliest possible time a team could get this is at around 20.5 minutes, not counting the time it takes for the teams to secure it. In the match, the first dragon was taken at 17 minutes in, meaning the earliest possible time to achieve Dragon Soul is 35 minutes. Throughout this tournament, the average game duration was 38 minutes, which means it is often that games end before Dragon Soul. This incentivizes some teams to go with a strategy that closes games out early before the possibility of a fourth dragon spawning, by playing for alternative objectives that grant them more valuable immediate rewards. While this is healthy for the competitive dynamics of the game as it promotes a variety of strategic approaches and not just a single path to victory, there is a bigger issue at play.

The pattern of "give and take" that often emerges around objectives like dragons can indeed lead to a state of equilibrium, where teams consistently opt for trading objectives rather than directly contesting them. This strategic behavior creates a predictable pattern where both teams are aware that when one team commits to

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securing a dragon, the other will capitalize on different strategic opportunities elsewhere on the map, such as taking turrets, securing vision control, or grabbing other neutral objectives. Over time, this repeated behavior can stabilize the state of play into an equilibrium where neither team gains a significant advantage, prolonging the game without dramatic shifts in control or momentum.

This equilibrium state is characterized by each team making moves that are safe and calculated to counterbalance the opponent's actions, rather than taking bolder, riskier actions that might obstruct the team's strategy. The result is a game that plays out in a relatively predictable manner, with both teams achieving incremental gains but neither able to secure a decisive advantage. This can lead to prolonged periods where the game's outcome remains undecided, as each team efficiently neutralizes the other's advances. We referenced that viewers value unpredictability, but in this case while the result of the game is unpredictable, the gameplay is not. While this approach minimizes risk and avoids critical game-losing mistakes, it can also dampen the dynamic nature of the game. The dominance *League of Legends* has on the esports scene is tremendous but matches like this repel individuals from immersing themselves.

DISCUSSION

Our study examines Nash Equilibrium in *League of Legends*, focusing on the draft phase and early game strategies, alongside the balance between player agency and game objectives. The draft phase was identified as a critical factor influencing game outcomes, with certain champions like Aatrox dictating predictable strategies and reducing strategic diversity. This predictability extends into the early game, where teams often engage in a "give and take" strategy, opting for safer, reciprocal plays over direct confrontations. This approach leads to an equilibrium state where teams' actions become highly anticipated and counteractive, resulting in gameplay that lacks dynamic shifts and reduces the potential for unexpected outcomes.

This equilibrium not only minimizes risks but also impacts the spectator experience by reducing the unpredictability and excitement of the game. The findings emphasize a tension in competitive game design between structuring gameplay to ensure fairness and maintaining enough flexibility to allow for creative strategic plays that enhance player engagement and spectator interest.

FUTURE RESEARCH

Future research should aim to bridge this gap by potentially collaborating with existing game development platforms or utilizing modifiable game engines that allow for easier adjustment and testing of game mechanics. Such cooperation could lead to the development of a prototype that enables the examination of various strategic dynamics under controlled conditions, thereby providing more verifiable support to theoretical analysis. Additionally, integrating artificial intelligence and machine learning to simulate different strategies and their outcomes in this prototype could offer valuable insights into the effects of subtle changes in game design on player agency and game balance. This approach would not only validate the findings from this research but also help in understanding the broader implications of Nash Equilibrium in competitive gaming environments. This research could lead to practical recommendations for game designers on how to create more engaging and dynamic

gameplay experiences that maintain competitive integrity while promoting a higher degree of player agency and strategic creativity.

CONCLUSION

This study provides a nuanced understanding of how Nash Equilibrium manifests in *League of Legends*, highlighting the interconnected roles of the draft phase, early game strategies, and the strategic interplay involved in achieving game-defined objectives. These factors contribute to a highly formulaic and deliberate equilibrium state that not only dictates player actions but also significantly impacts the spectator experience. While such equilibrium contributes to stable game dynamics, it also risks diminishing engagement and excitement, potentially stunting the growth of the esports audience. In response to these challenges, there is a crucial need for dynamic game designs that actively disrupt these predictable patterns. Incorporating adaptive game mechanics that evolve with player strategies and community feedback could sustain long-term player engagement and viewer interest.

Furthermore, fostering a continuous feedback loop between players and developers can provide insights that lead to more responsive and player-focused game adjustments. This approach not only enhances the gameplay experience but also ensures that the game remains relevant and exciting within the fast-evolving esports landscape. By addressing these areas, game designers can ensure that strategic creativity and player agency are enhanced, not neglected, promoting a richer, more vibrant competitive environment. This will not only elevate the player experience but also potentially increase viewer engagement, contributing positively to the broader esports ecosystem.

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