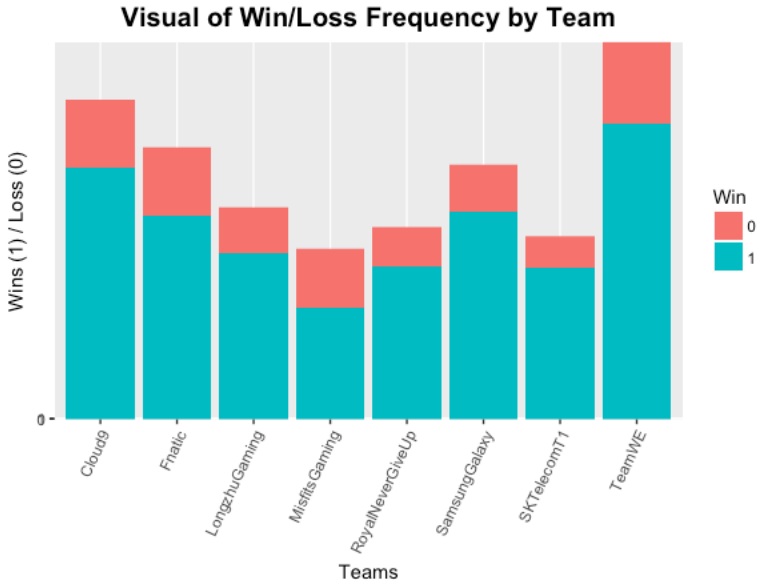
League of Legends: Who Wins and Who Loses?

Perhaps one of this year's largest trophies will be awarded in Seoul, South Korea: The Summoner's Cup, a 70-pound trophy awarded only to the Champions of the League of Legends World Championship Tournament. With a prize so impressive, it's no surprise that there were roughly 60 million viewers at the last event in Beijing.

To lift the trophy, you need to win, and keep winning; inviting a challenge to predict an individual's probability of winning a game on any given tournament match day. As an individual player, you may feel that items and skills are everything. Yet, skills alone make it difficult to predict an outcome (win or loss) of the game as there is huge variability between each player and their comfort level.

Taking a glimpse at the data from the League of Legends Gamepedia website for the 2017 World Championship outcomes, our model considered the top 8 teams.



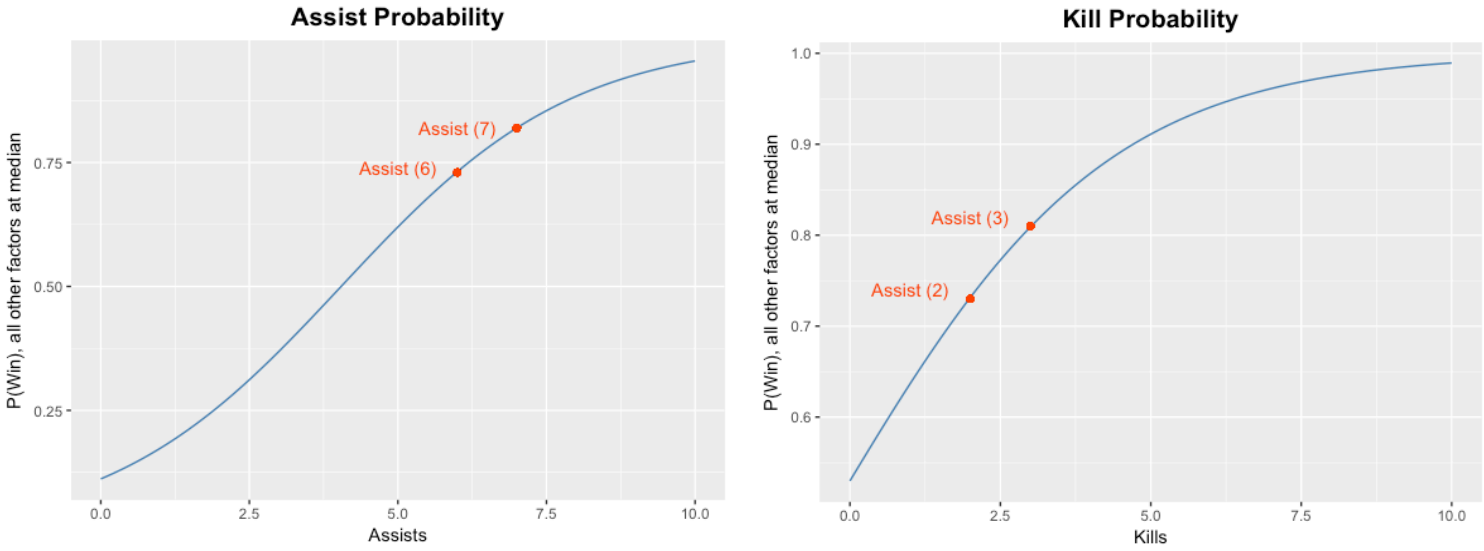
Rank	Team	Loss	Win	Win %
1	Samsung Galaxy	170	347	67.12%
2	SK Telecom T1	96	251	72.33%
3	Royal Never Give Up	118	230	66.09%
4	Team WE	254	454	64.12%
5	Longzhu Gaming	148	266	64.25%
6	Misfits Gaming	189	187	49.73%
7	Fnatic	220	338	60.57%
8	Cloud9	215	398	64.93%

Originally, Samsung Galaxy was second in their bracket, losing to the 3rd seat team. Yet, even without the highest frequency or proportion of wins, they were able to come out on top. We also cannot forget that each team has different numbers of players, so the percentage of wins will also account the number of players per team. All the teams had 5 players except for SK Telecom T1 (4), Misfits Gaming (4), and Royal Never Give Up (3).

What Goes into these Wins?

Digging deeper, we investigate some of the key performance indicators that lead to increased wins. One of the biggest effects we noticed was in *Assists* followed by *Kills*. An assist is the action of helping a player 'kill' an opponent. Assists can occur by hitting the champion within the last 10 seconds before their death, without killing them. A kill is performed by hitting an enemy until their health goes to zero.

If we were to hold all other effects constant, we notice how every additional assist increased the odds of winning by an estimated 66.97% (95% CI: 0.47, 0.65). Subsequently, the estimated odds of winning increased by 55% (95% CI: 0.47, 0.65) for every additional kill performed. The graphic below displays the probability of winning for both assists and kills.



The *typical* player's probability of a win jumps from an estimated 73% to 82% for an additional assist. On the other hand, the probability of a win with one additional kill also starts at around 73% and increases to about 81%. Yet, the higher these kills and assists get, the change in probability of winning decreases over time. In other words, more kills and assists doesn't necessarily mean you will win, but it certainly helps!

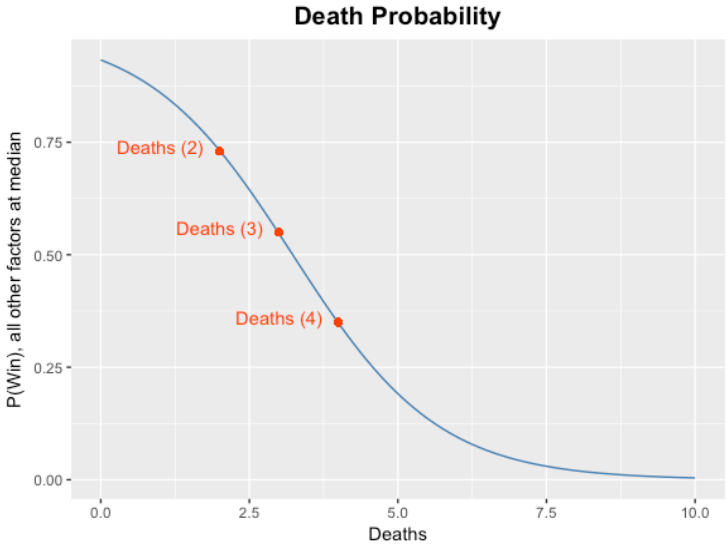
At first, this result may appear atypical as a kill may seem to have more weight on winning the game. However, we cannot forget that an assist already accounts for a kill occurring, thus suggesting that players are spending efficient time working with each other. Furthermore, the kill graphic indicates how players can have no kills and still have a win, thus proposing some uncertainty even at lower kill values.

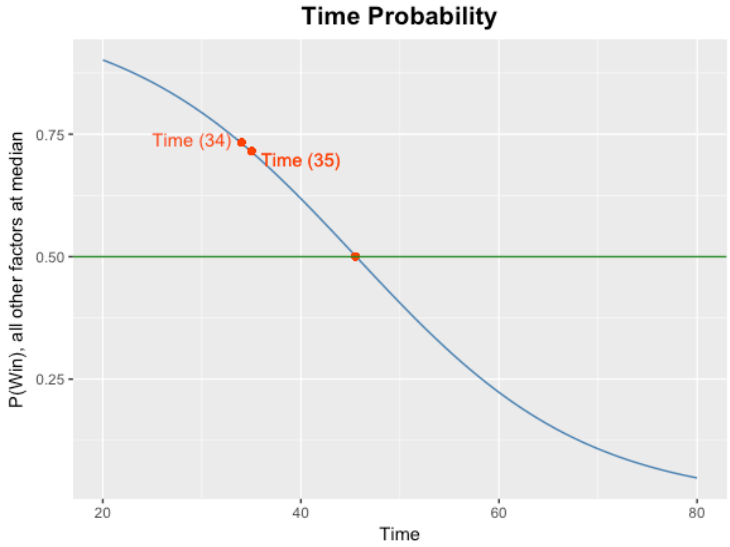
What Hinders these Wins?

During Gameplay, *Deaths* and *Time* were observed to be some of the main effects that lead to loss. Deaths occur when a player is 'killed' by an opponent. Each death counts as a penalty against the player as respawn time allows the enemy to capitalize and earn incentives. Time is defined, simply, as the duration of gameplay in minutes. Game lengths tend to vary as the objective is to destroy the other team's 'nexus'. Our data ranged from around 20 minutes and stretched all the way past an hour.

Deaths are an obvious effect that deter wins. Holding all else constant, each death increased the odds of losing by 55.74%. For instance, these professionals typically die around twice per game, so the probability of winning with an additional loss puts you at 55%, but if they were to die four times, you're running out of luck. By contrast, deaths and assists seem to have similar, but

opposite odds towards wins. Indeed, it's extremely rare for these professional players to lose even more than 3 times (~8.9% of players), but there have been occasions when deaths exceeded 6,7, even up to 10.





More time also seems to act as an enemy for players. Games typically run from 30-40 minutes, but any more time and your chances of success diminishes swiftly. Every additional minute decreased the odds of a player win. This goes to show that the defensive approach is less likely in your favor. The quicker a team presses for a win, the better their chances are in winning. We notice this taking place on the graphic as a game reaches 45 minutes, the probability of winning dips to 50%. Of course, this isn't a blanket statement declaring that more offensive teams will win, as there are many strategies that seek to capitalize on enemy errors, or even mismatch events that just naturally end earlier. It just means that time is a statistically significant indicator; for each additional minute played, there is an estimated 8 percent decrease in odds of winning, ceteris paribus.

For the last five years, the tournament champions had been either the SK Telecom team or the Samsung teams. They are no doubt amongst the favorites for this upcoming September. Yet, upsets aren't unreasonable in this game. With many more potential lurking effects besides kills, assists, time, and deaths, predictions of this game are like any other sport: You sometimes just never know what happens. However uncertain, these probabilities still give us a little bit of insight on what kinds of teams with individual players have a better chance when faced with each other. Maybe these predictions will give us a snippet in forecasting the results for 2018.