

The Case for KDAValue: A New Metric

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Abstract Competitive League of Legends has been using the same metrics for the past decade. While there has been introductions to new and useful metrics, there are few that most viewers and consumers tend to lean towards. KDA (Kill Death Assist Ratio) and KP (Kill Participation), using the data from the League Championship Series Summer Split 2021, this exploratory analysis dives into KDA & KP relations and provides a new metric KDAV (Kill Death Assist Value) used in tandem with KDA, KP, as well as other metrics, it helps paints a better picture of how a player has performed in a game.

1 Introduction

Player	KDA	KP
Player 1	2	100%
Player 2	2	100%
Player 3	2	100%

Table 1.1

Look at Table 1.1 Which player outperformed? Without much context it is safe to say they all did exactly the same.

Player	Role	Kills	Deaths	Assists	KDA	KP
Player 1	Mid	1	1	1	2	100%
Player 2	Bottom	10	5	0	2	100%
Player 3	Support	0	3	6	2	100%

Table 1.2

Now which player in Table 1.2 outperformed? In competitive League of Legends where team play outweighs individual play it is still hard to say. If kills is what wins games, then Player 2 outperformed. If Player 3's death's were sacrificial, and his assist's helped win the game, there's a solid argument for Player 3. Competitive play can be slow, there's always a chance that Player 1 helped win the game, although there weren't many kills or deaths in the game. Again, context goes a long way in a complex game like League of Legends. But with only the KDA and KP values to look at these tables doesn't give you the full story.

While this paper won't go into what constitutes a win or a loss, it explores how giving each individual kill, assist, and death a value suggests a better understanding of a player's individual performance in a game.

1.1 KDA - Kill Death Assist Ratio

KDA is a ratio used to describe the number of kills plus assists one has divided by the number of deaths.

$$KDA = \frac{Kills + Assists}{Deaths} \quad \text{or} \quad KDA = Kills + Assists$$

KDA is an extremely useful metric, especially for those not wanting to dive into the performance of a player, but at a glance, KDA can be misleading. KDA doesn't fully describe what happened in the game itself. Arguably a Solo Kill, granted the victim isn't worthless in gold value, should be ranked higher than a kill where all teammates have assisted. A solo kill can show individual skill, it should also penalize a player who got solo killed. A kill where the whole team was involved should be given a lesser value, although the impact of the kill in the game isn't any less, the player who was awarded the kill and the player who was killed should be ranked lower than that of a solo kill.

While solo queue players tend to rely on themselves to win games, competitive League of Legends revolves around team play. KDA does a poor job of showing this, which is why KP is commonly used with it.

1.2 KP - Kill Participation

For those looking for more of an understanding of the game KP is commonly used to describe a players overall involvement in the game. KP is the players kills plus assists divided by the team's total kills.

$$KP = \frac{Kills + Assists}{TotalTeamKills}$$

This is a metric that gives a ratio to show how involved a player was. The criticism of the KDA metric stems from not showing a players performance with the team, and KP does a great job doing this. Alone, this metric is not as meaningful. Together the metrics describe a players performance in a game, but not so thoroughly.

1.3 KDAV - Kill Death Assist Value

While both metrics have its pro's and cons, and have stood the test of time together. The metrics have more flaws than not. When trying to wrap my head around how to better these metrics, giving individual actions during a game a value seemed to be a good idea. KDAV gives a numeric point value to players who participated in a Kill or Death.

$$KDAV = (KV + AV) - DV$$

In total these can be used as 4 different metrics, but KDAV sums them all up. In *Figure 1.1* the point system assigned to each event in the game is shown.

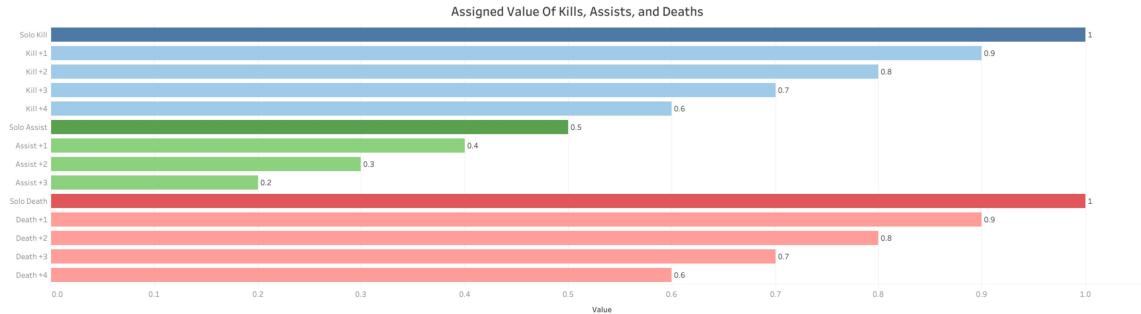


Figure 1.1

KV - Kill Value Can be used to see how much a player impacted or is impacting a game based on his kills alone. A player with more solo kills will typically have a higher value than a player who is only involved in team fights.

$$KV = (SoloKills \times 1) + (Kill^1 \times 0.9) + (Kill^2 \times 0.8) + (Kill^3 \times 0.7) + (Kill^4 \times 0.6)$$

DV - Death Value Can be used to see how poorly a player or role, champion, etc. stacks up against the rest of the league. A player who only dies in team fights will have a much lower DV.

$$DV = (SoloDeath \times 1) + (Death^1 \times 0.9) + (Death^2 \times 0.8) + (Death^3 \times 0.7) + (Death^4 \times 0.6)$$

AV - Assist Value Can be used to see how much a player is involved with the team. This metric is great for the role of support and can be used as a stand alone metric to rank supports among themselves.

$$AV = (SoloAssist \times 0.5) + (Assist^1 \times 0.4) + (Assist^2 \times 0.3) + (Assist^3 \times 0.2)$$

2 Analysis

2.1 League Averages

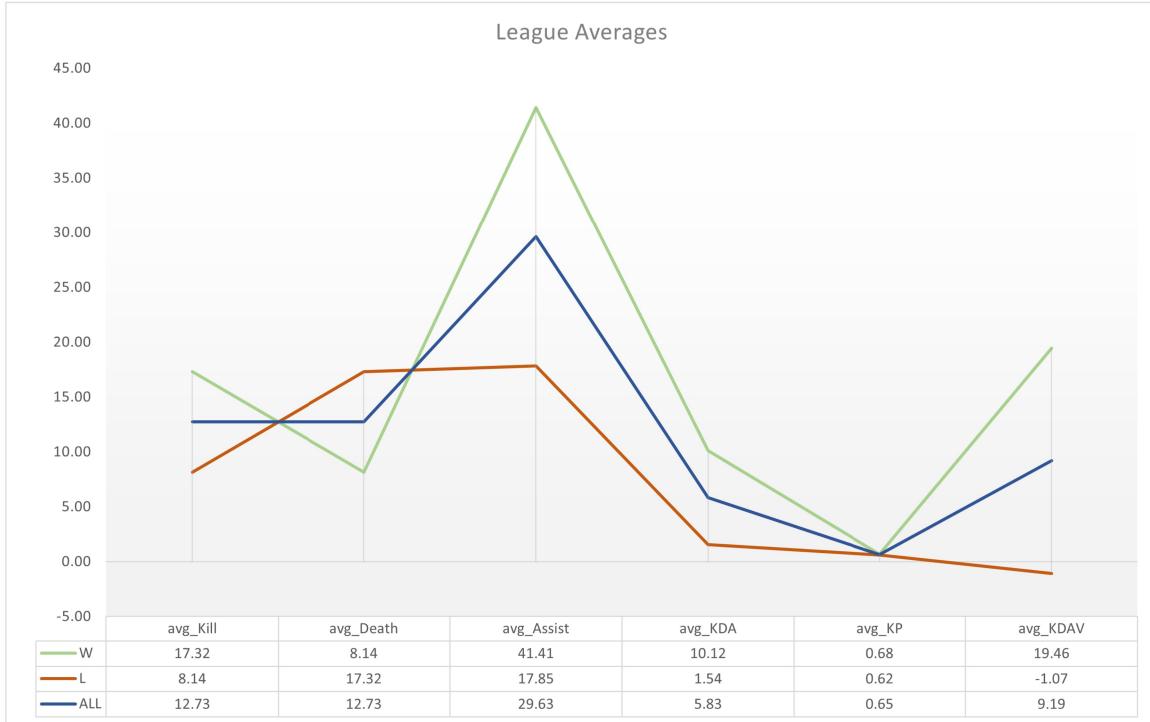


Figure 2.1

In Figure 2.1 the analysis shows there is a common trend between the league average, as well as the standard deviation between wins and losses. What stands out is that regardless of Win or Loss KP remains the same. With a deviation of $\pm 3\%$.

As suspected KDAV and KDA both show big differences between a win, loss, and league average. KDA shows a ± 4.29 deviation while KDAV shows a ± 10.26 deviation. Where KDA can only go as low as 0, KDAV can in theory have an infinite negative value. Therefore KDAV has more potential to show under performers than KDA.

2.2 KDA & KDAV

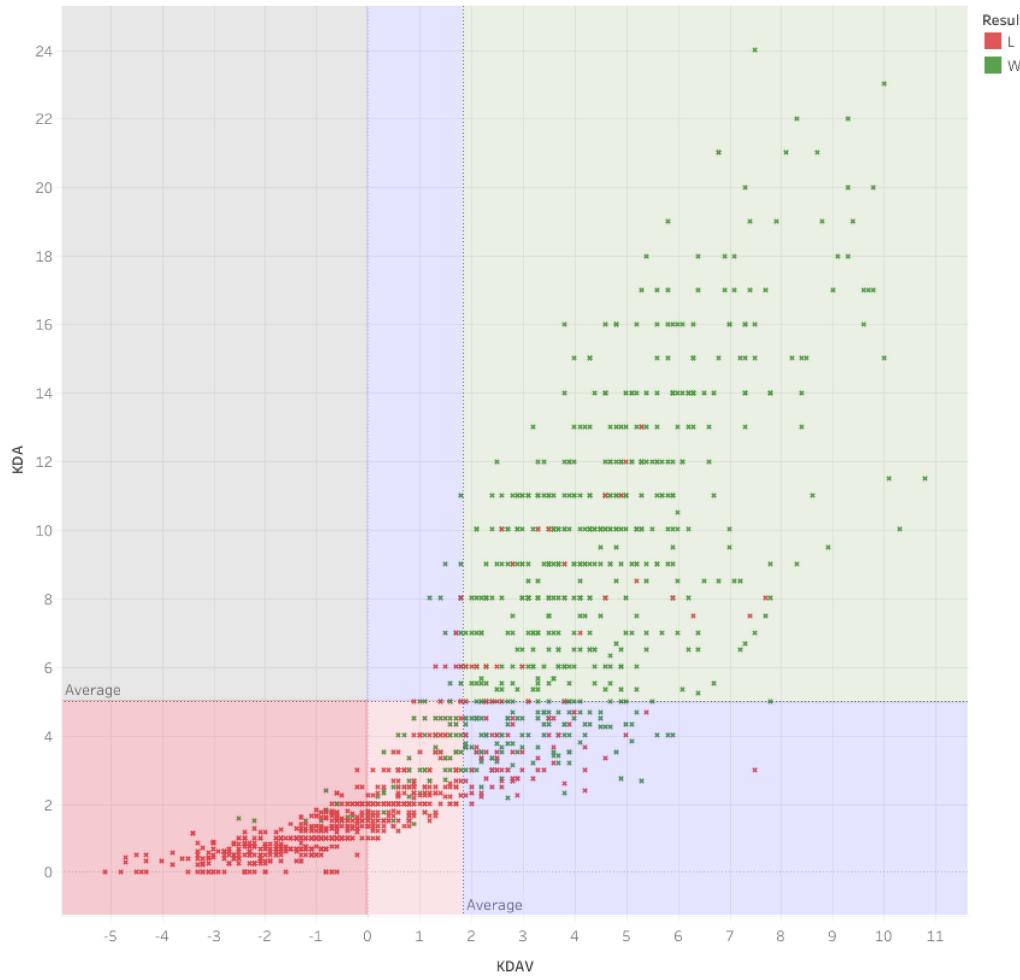


Figure 2.2

Together *Figure 2.2* KDA and KDAV show a common trend. The lower you are from league average in KDA or KDAV the more likely you are to lose a game, while the opposite is true for a win. There will always be outliers in any dataset, but this goes to show, that KDA and KDAV can be used together to better show how a player performed in a game.

2.3 KP, KDA & KDAV



Figure 2.3

In Figure 2.3 we see the relation between KDA to KP and KDAV to KP, While losses tend to be on the lower end of a players KDA and KDAV to KP, KP looks to be random with no real correlation. This is where the problem shines. A team with 1 total kill can give a player a 100% KP for participating in the kill with the rest of his teammates, not to mention the player can have an abysmal .01 KDA, while also sporting a 100% KP.

2.4 KDAV Averages

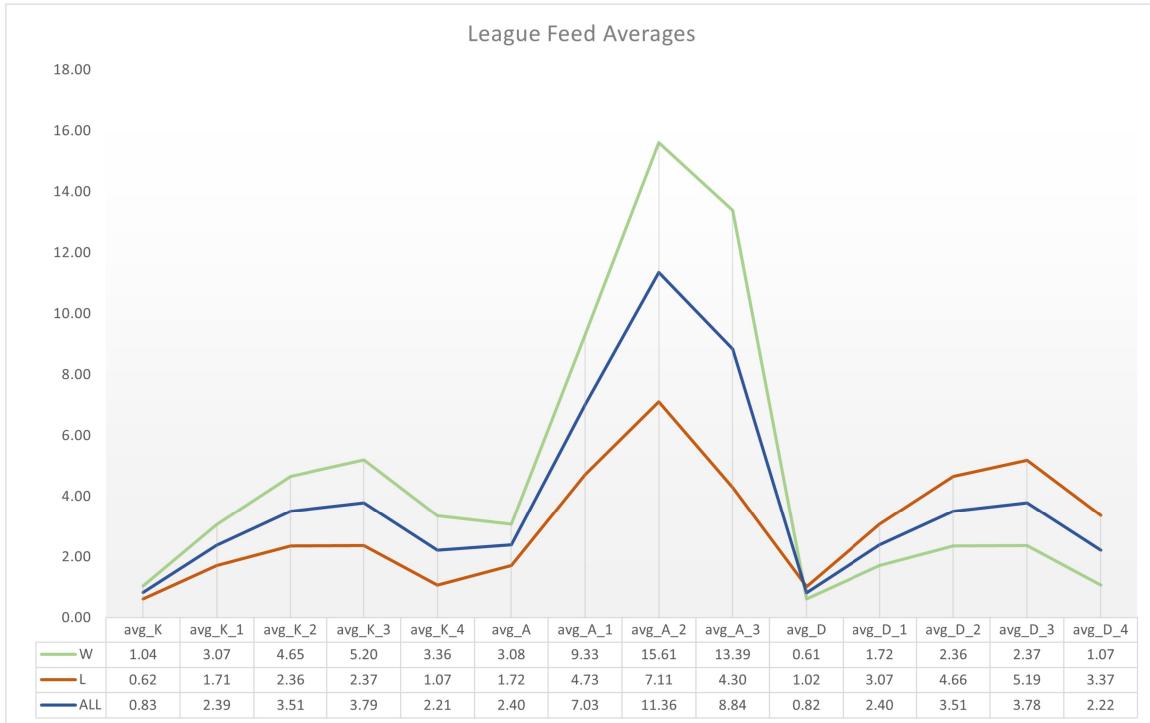


Figure 2.4

Figure 2.4 shows the league averages, wins and losses, in all kill feed actions that can be recorded in the game. As stated before Competitive League of legends is reliant on team play, so we see a dip in solo

kills and solo deaths. Another hypothesis is that in online queued games the solo kill numbers would spike drastically, unlike competitive game play.

2.5 By Role

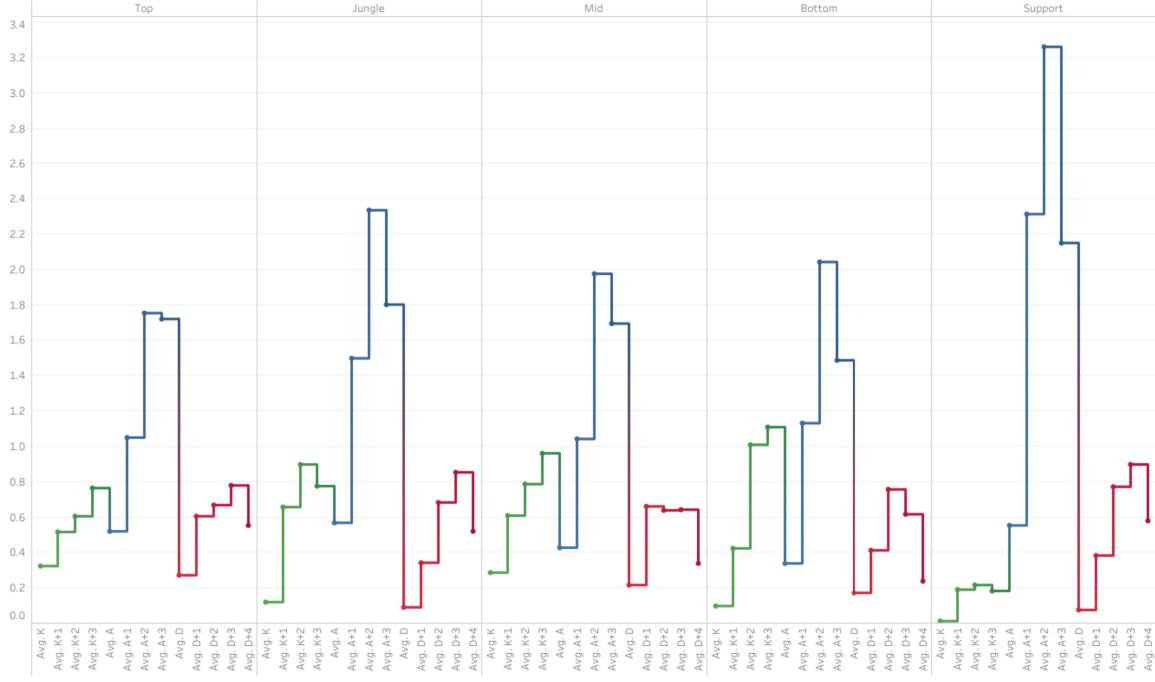


Figure 2.5

In Figure 2.5 we see by role the average kill feed actions players got per game. As predicted the Support role on average creates a significant amount more assists than any other role. Because of this, AV should be included with other metrics, when evaluating or ranking players in the Support role.

2.6 By Player

Player KDA to KDAV

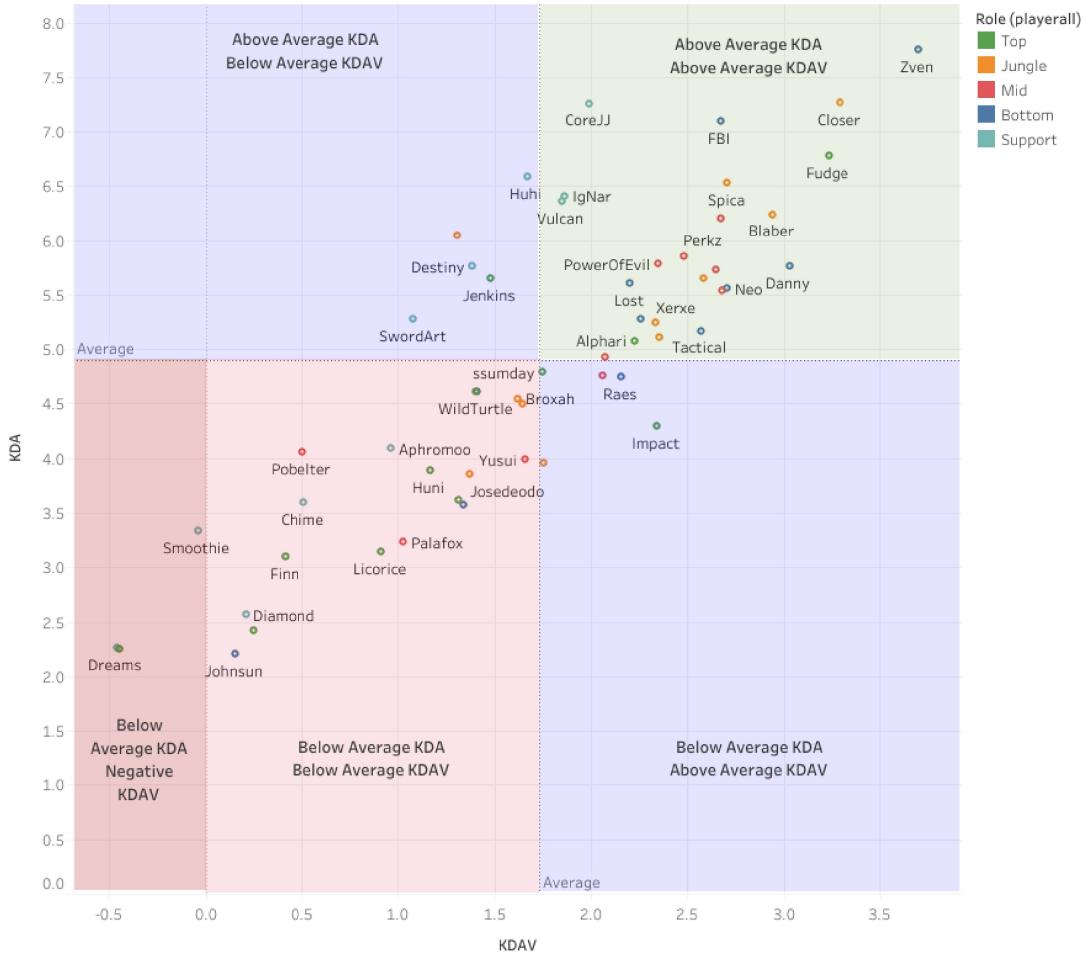


Figure 2.6

Figure 2.6 Shows the average KDA and KDAV per player throughout the regular summer split. With this visualization we can start ranking players based off these two metrics. See Table 2.1

Tier	KDAV	KDA
S Tier	Above Average	Above Average
A Tier	Above Average	Below Average
B Tier	Below Average	Above Average
C Tier	Below Average	Below Average
D Tier	Below Average	Negative Value

Table 2.1



Figures 2.7

Figures 2.7 Shows the correlations between each role and where the players are located on Figures 2.6

3 Conclusion

3.1 Final Evaluation

Player	Role	Kills	Deaths	Assists	KDA	KP	KDAV	KV	DV	AV
Player 1	Mid	1	1	1	2	100%	0.1	0.9	1	.2
Player 2	Bottom	10	5	0	2	100%	5.3	9.1	3.8	0
Player 3	Support	0	3	6	2	100%	-0.2	0	2.2	2

Table 3.1 : Random Values Generated

Now lets consider *Table 3.1* who outperformed? Using more metrics we can say that Player 2 outperformed when only comparing these 3 players. But like before, more context is needed.

We can refer back to *Figures 2.7* and we find that Player 1 drastically under performed given his role averages, and referring back to *Figure 2.6 & Table 2.1* assigning him a C Tier performance.

Player 2 can be given an A Tier performance using the same Figures and Tables. The player had plenty of kills, but because of his high death count it puts him under the league average KDA.

Player 3 can be assigned a D Tier performance, due to him having a negative KDAV. Supports on average have a KDA of about 4.9 and a KDAV of 1.0. This is the worst performance of the three players given the comparison of all three players to league averages as well as role averages.

3.2 Final Thoughts

While the new metric KDAV has its flaws, just like any other metric. It helps build the story, of how a player performed in a game when only looking at Kills, Deaths, and Assists. League of Legends is a complex game, and competitive LOL is played so much differently than regular online queues. But when using KDAValue in connection to other metrics, league and role averages, we can better evaluate players and how they stack up in a competition like the League Championship Series.