# World of Warcraft Data Analysis : Using Raiding Data To Improve Guild Performance

## Introduction:

World of Warcraft (WoW) is an incredibly popular massively multiplayer online roleplaying game (MMORPG) first released in 2004. The game allows players to raid- that is, the chance to encounter a weekly in-game dungeon called a “raid zone”. During raids, players work together to defeat challenging Non-Player Characters (NPCs) which are typically referred to as “bosses”. WoW has aged to such a degree that two versions are now available: “classic” and “retail”. This analysis is more applicable to and uses data procured from the former. This is significant because there are distinct differences between the two versions in how valuable each metric can be to gauge player performance and execution.

Raiding is an aspect of World of Warcraft that has been, and continues to be, optimised continually by guilds globally in a race to achieve the best possible performance from a group of players. Preparation and execution are vital raiding elements and are trackable through various metrics. In this analysis, these metrics are used to determine how preparation and execution change in tandem with guild performance. The performance of a guild will be evaluated by the time taken to complete a raid.

## Data and Modelling:

Python was used to query the publicly available API at Warcraft Logs via GraphQL. The outputs of the queries were organised into separate functions based on the metric the data pertained to. Reports are generated by players in-game and later uploaded to WarcraftLogs. User input would determine: the guild to retrieve data from, the raid zone of interest and the specific reports to analyse. For this analysis, only the raid zone “The Temple of Ahn’Qiraj” (AQ40, or AQ) was used. All data was obtained from the “Season of Discovery” variation of classic WoW.

User report entries were validated in Python before the collected data was organised into their respective metrics. Only fully completed raid zone reports were accepted to ensure visualisation clarity, which incomplete reports would otherwise make unclear. Reports sometimes contained players who did not actively participate in the raid, resulting in data contamination. As a result, some functions contain lines that filter these players out during the cleaning process. The functions that collected and organised the metric data were looped through the user-specified reports, amalgamated, and then packaged into data frames for use in MySQL Workbench.

The credentials of the user’s MySQL Workbench database are requested. Functions are called to create tables in the database for each metric and import the corresponding data within them. Initially pulled data via GraphQL would occasionally consider a single player to have two distinctly different roles. Consequently, a single player appeared as two. SQL

queries were run to prevent this duplication of data. SQL queries were also used to create an ID table with IDs that uniquely identified players. This was a valuable way to improve performance in PowerBi, as names from other table metrics could be visualised through their established relationship with the IDs table, as opposed to mandating player names in every table.

In PowerBi, the relationship between the dates of different table metrics was used to create an interactive report that allows users to observe metric fluctuations across a variety of dates. A schema was created for each raid zone. This enabled rapid data visualisation for different guilds through the simple replacement of data supplied to the visuals. Therefore, comparisons can be made between the visuals of a user's guild against various top-performing guilds to determine trends and differences. Based on the findings, actionable recommendations can be derived to improve performance.

## Results:

This analysis uses the data obtained from four weekly reports by the guilds "ZØMBIES" and "Praxis". The former is considered to be a guild of average performance, whereas the latter is considered to be among the top-performing guilds in the world. The raid zone that this data was acquired from is called "The Temple of Ahn'Qiraj" (AQ40, or AQ).

As the measure of guild performance will be taken as the time taken to complete a raid, a key feature to establish are trends in metrics between each guild's fastest and slowest raid report. These trends may point to how a metric may influence the time taken to complete a raid. The trends can then be evaluated to suggest the type of change required within a metric to contribute towards a more efficient raid performance.

**Raid times:**

From the four reports of Praxis, their fastest and slowest completion times of AQ40 were: 41 minutes on 08/01/25 (Figure 1.1) and 1 hour 47 minutes on 15/12/24 (Figure 1.2) respectively. However, the fastest and slowest AQ40 completion times for ZØMBIES were: 1 hour 42 minutes on 08/01/25 and 2 hours 8 minutes on 28/12/24 (Figure 1.3) respectively. Between these times, Praxis recorded a clearance speed improvement of 61.7%, over three times that of ZØMBIES which was limited to just 20.3%. This significant difference suggests a clear contrast in the effectiveness of later adaptations made by Praxis compared to ZØMBIES.

Five metrics will be explored to help explain this difference in improvement. They are: the time taken to kill a boss (boss kill times), the performance from individual players (parses), items consumed within the raid zone (consumables), world buffs (effects that enhance a player's abilities) and the number of player deaths. The first of these metrics to investigate is a pivotal cornerstone to every fast clear time: player deaths.


Figure 1.1: Raid times by Praxis.


Figure 1.2: Raid times by Praxis.


Figure 1.3: Raid times by ZØMBIES .


Figure 1.4: Raid times by ZØMBIES .

**Number of deaths:**

The inability to manage the number of player deaths to a minimum may severely impede a guild's ability to clear a raid zone quickly. The loss of a player will, in the case of one that deals damage, result in a lower raid-wide damage output and reduced speed and, in the case of a healer, potentially result in a domino effect of additional deaths.

Praxis recorded a total of 75 deaths during their slowest raid. Deaths were spread across a variety of players as 20 unique players recorded over 2 deaths each, with players reaching as many as 6 and 5 deaths (Figure 2.1). This is suggestive of raid-wide complications as opposed to lacklustre individual performances. There is a strong contrast between this and their fastest raid, where the total number of deaths totalled just 17 - a reduction of 77.3%. Furthermore, not a single player died more than 2 times (Figure 2.2), an achievement which implies an impressive level of collective focus and coordination by players.

Interestingly, ZØMBIES also recorded 75 deaths in their slowest raid. This finding is not massively surprising considering the difference in times between each guild's slowest report is just 20 minutes (Figures 1.2 and 1.3). Additionally, ZØMBIES shared a similar abundance

in raid-wide player deaths, as 14 unique players recorded more than 2 deaths. However, the defining difference between the two guilds lies in the 57 deaths ZØMBIES recorded in their fastest raid, yielding a reduction of just 24.0%. This is a change over 3 times less impactful than that of Praxis. Furthermore, 8 unique players were still observed to individually record greater than 2 deaths (Figure 2.4).

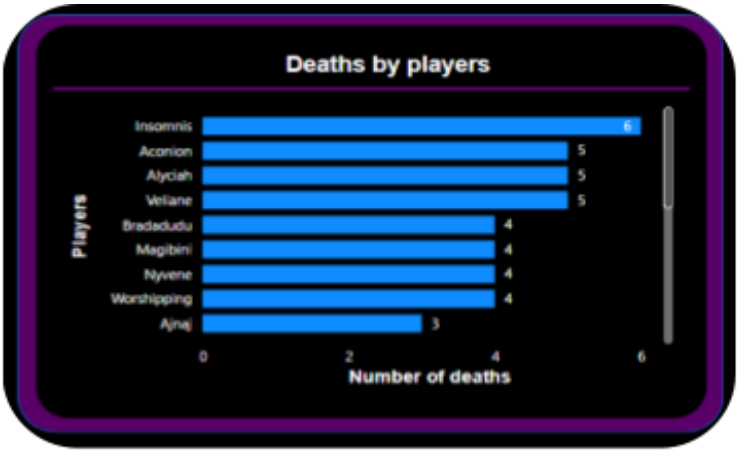


Figure 2.1: Slowest raid by Praxis. Highest deaths by players.

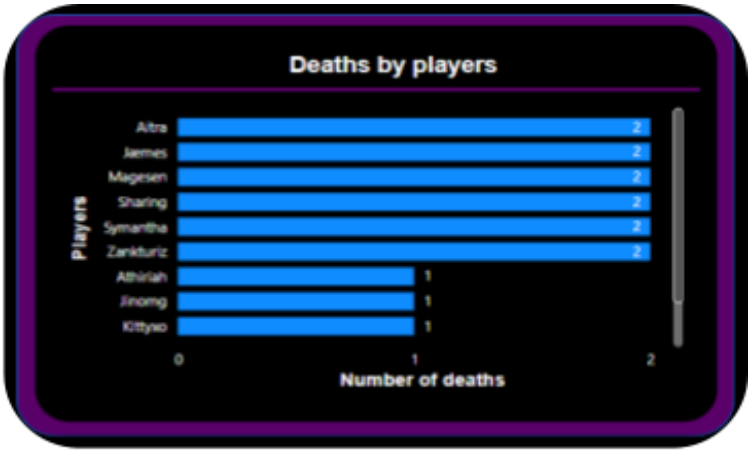


Figure 2.2: Fastest raid by Praxis. Highest deaths by players.

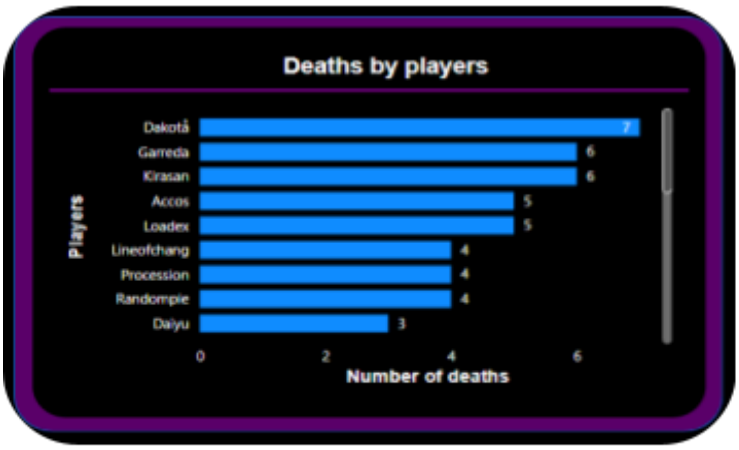


Figure 2.3: Slowest raid by ZØMBIES . Highest deaths by players.

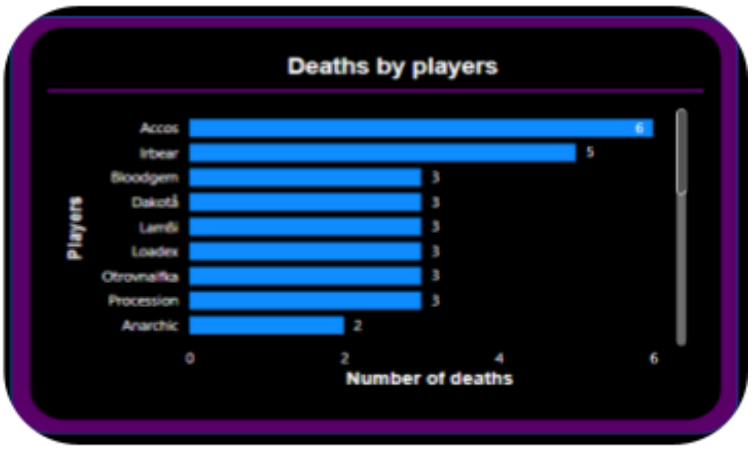


Figure 2.4: Fastest raid by ZØMBIES. Highest deaths by players.

The fastest raid by both guilds shows a reduction in the number of player deaths they culminate in. This highlights the importance of player death management. Praxis has proven to be much more adept in handling this area by likely addressing raid-wide complications that may have resulted in multiple deaths at a time. This is an area that ZØMBIES can do more to address. Again, except now in the context of death counts, Praxis outperforms ZØMBIES by a factor of 3. However, through the deliberate use of particular consumables, a guild may further improve its efficiency.

**Consumables:**

Consumables can generally be categorised into two groups: offensive consumables and defensive consumables. As their names suggest, the former will aid a player to increase their damage output whereas the latter will help prevent a player from dying. Only the most commonly used consumables of both types were included in the analysis. Of the offensive type, consumables included: firewater, cleansed firewater, mongoose, giants, arcane elixir, frost power, greater firepower and shadow power. Of the defensive typer, consumables included: GFPP (Greater Fire Protection Potion), GFrPP (Greater Frost Protection Potion), GNPP (Greater Nature Protection Potion) and GSPP (Greater Shadow Protection Potion), invulnerability, greater armour, health II, Gordok green grog and rum black label.

The quantities, types and benefits of the various consumables being utilised can provide an insight into a guild's approach towards the raid. For instance, protection potions absorb some damage of a certain type so constant reapplication, and thus high usage may imply cautiousness from players. Consumables are also lost upon the death of a player, so a high consumable count could indicate that a player has died often. However, a high death count without a corresponding increase in consumable use may suggest a player's hesitation towards reapplication as consumables must be purchased for use.

In the slowest raid by Praxis, 11 unique players can be seen to have utilised over 20 consumables (Figure 3.1). Of these players, 8 use 10 or more protection potions. This suggests a more cautious Praxis playstyle,  likely reflected in their slower raid completion time. In the slowest raid by ZØMBIES, 7 unique players are seen to have used more than 20 consumables and yet 13 players are still found to have used more than 10 protection potions (Figure 3.3). This may suggest that the players of ZØMBIES value protection potions, especially GNPPs, more highly than other consumables. The lack of commitment to offensive consumables may have contributed to the slower clear time. This could be explained by the guild's high death volume which may have disincentivised players to purchase offensive consumables they may lose shortly after.

The fastest raid by Praxis exhibits a very strong contrast to their slowest, where not a single player is seen to have used 10 or more protection potions or more than 20 consumables in total (Figure 3.2). For the fastest raid by ZØMBIES, these numbers become 2 and 0 respectively (Figure 3.4). Less offensive consumables are also used in the faster raid for each guild, likely because, in this context, reapplication is more infrequent due to lower player deaths. While almost every consumable is applied less often in the faster raid by Praxis, one consumable of interest shows a clear increase of 169%- the invulnerability potion.

The invulnerability potion is used in scenarios where a player deals an exorbitant quantity of damage, causing them to be targeted by an NPC. To avoid being immediately slain and still be able to deal damage, this potion provides 6 seconds of invulnerability. The growing use of this consumable suggests that the players of Praxis have switched from their presumably cautious playstyle to one of boundary-pushing. The absence of this trend in the fastest raid by ZØMBIES could imply the inability of players to output the level of damage that would

warrant its increased use. The increased damage output from players can be evaluated from the parses metric.

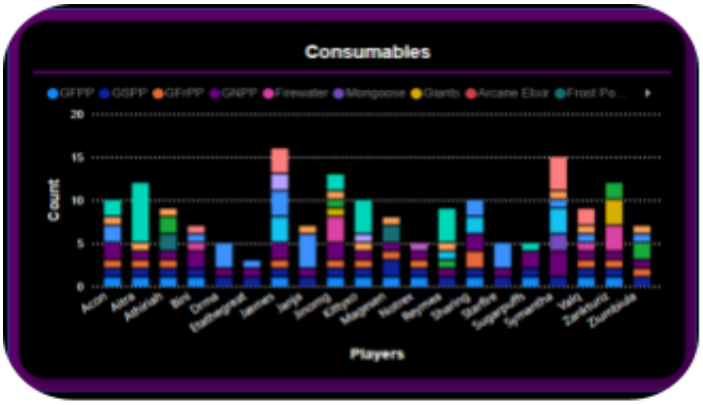


Figure 3.1: Fastest raid by Praxis. Consumables used by players


Figure 3.2: Slowest raid by Praxis. Consumables used by players

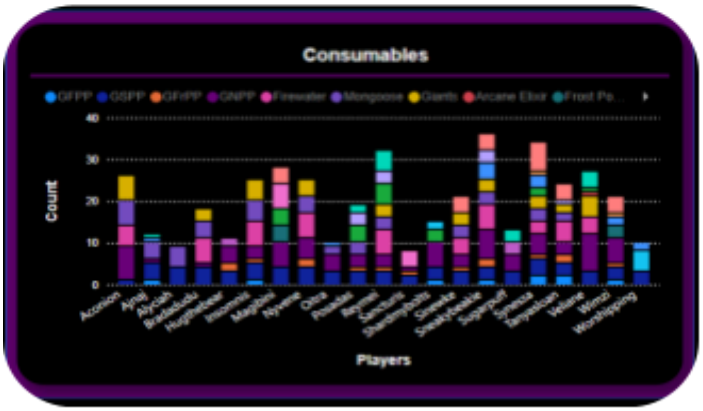


Figure 3.3: Slowest raid by ZØMBIES . Consumables used by players

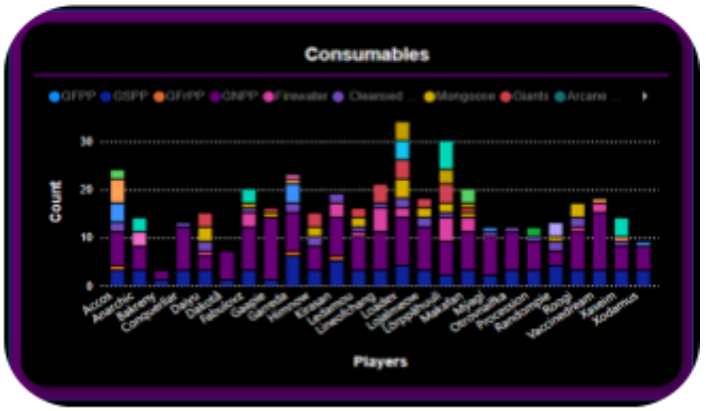


Figure 3.4: Fastest raid by ZØMBIES. Consumables used by players

**Parses:**

Parses are a metric that ranks a player's performance on a boss. There are different types of damage dealers and healers in WoW. A parse will compare the quantity of damage dealt and healing provided per second, by a damage dealer and healer respectively, against other players of the same character type. Thus, a player who achieves a higher parse has outperformed a larger proportion of other players with the same type of character. However, it is important to note that the parse of a healer is limited by the amount of healing required by the other players in their raid. This is especially apparent in faster raids where bosses die more quickly and less healing is required.

In the slowest raid by Praxis 10 different players achieved, at most, a single parse that was not above 50 on every boss. This number was 9 In their fastest raid, suggesting a consistent level of performance by members of a raid, relative to other players of the same character

type. This is important to achieve, at minimum, as players will progressively obtain more items to increase their damage and healing output. As a result, it is not enough to simply deal more damage and provide more healing but to output a proportionately higher amount relative to the upgrades obtained.

In the slowest raid by ZØMBIES, just 3 players achieved, at most, a single parse that was not above 50 on every boss, which improved to 8 players in their fastest raid. While this increase is impressive, and just 1 less than that of Praxis, it also suggests that parses are not an effective metric to use when evaluating clear efficiency. A raid does not consist of bosses alone and requires guilds to defeat NPCs of other kinds too. Since a significant trend is absent between both guilds in this metric, perhaps more emphasis must be placed on how efficient a guild is during periods between boss encounters. The time taken to kill bosses is a metric that can be used to corroborate or refute this possibility.

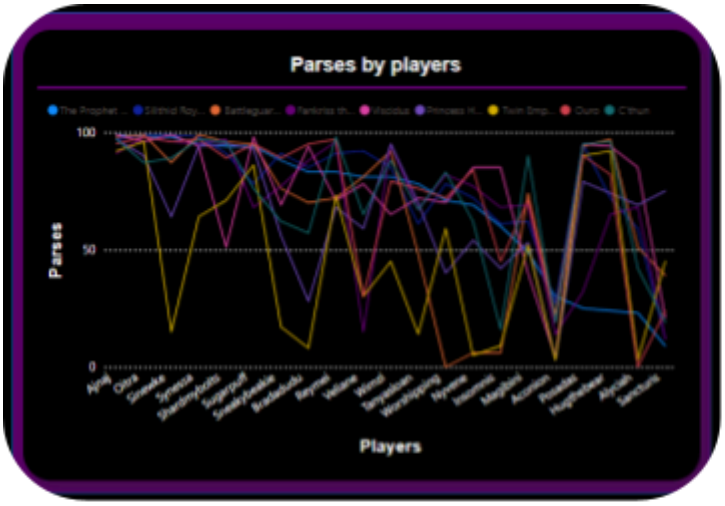


Figure 4.1: Slowest raid by Praxis. Parses by players.

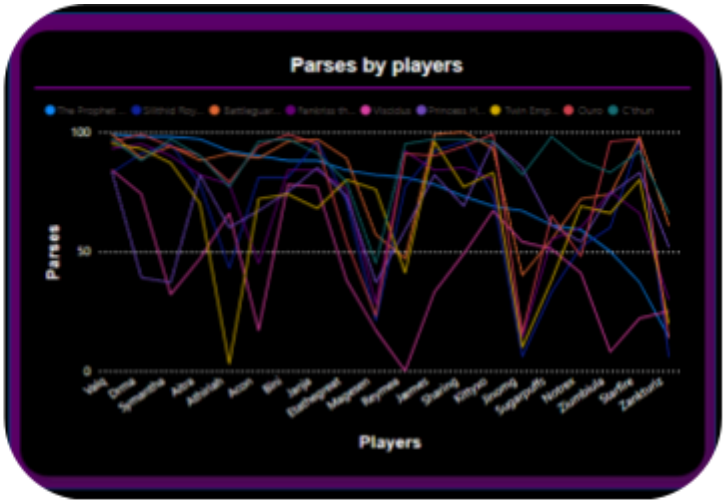


Figure 4.2: Fastest raid by Praxis. Parses by players.

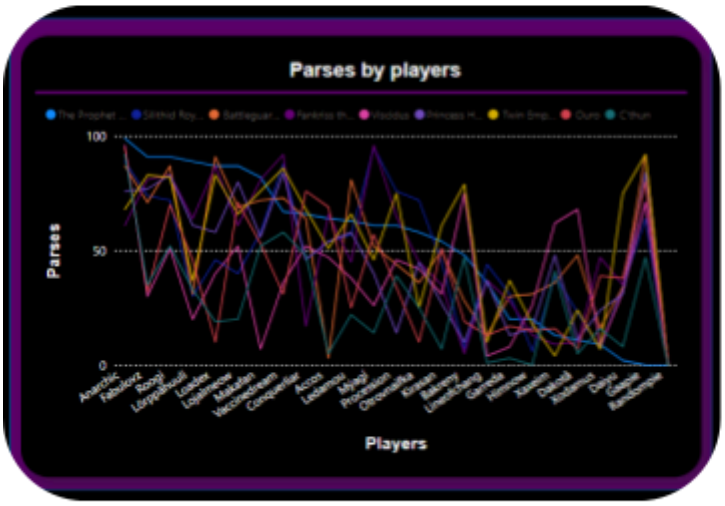


Figure 4.3: Slowest raid by ZØMBIES. Parses by players.

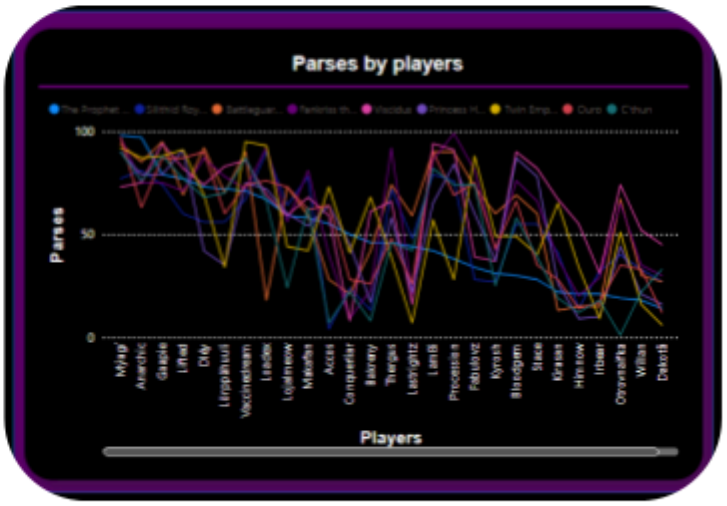


Figure 4.4: Fastest raid by ZØMBIES. Parses by players.

**Boss kill times:**

Between the slowest and fastest raid by Praxis, every boss is killed with less time- particularly on bosses like “Twin Emperors” and “C’Thun” where the time taken is shortened by 2 minutes 44 seconds and 2 minutes 50 seconds, respectively (Figure 5.1 and 5.2). The same can be observed by ZØMBIES, particularly the 5-minute 26-second reduction for C’Thun (Figures 5.3 and 5.4). Between the times taken in both guilds’ fastest report to kill each boss, Praxis is faster 7 of 9 times. However, this would only make the fastest raid by Praxis 2 minutes and 25 seconds shorter than the fastest raid by ZØMBIES. This accounts for just 3.96% of the total time difference between each guild’s fastest report. As a result, I believe boss kill times, like parses, is a very limited metric that cannot be used to evaluate a guild’s overall efficiency in a raid. This lends more support to the idea that the key to a more efficient clear in AQ40 lies in the performance of a guild between bosses.

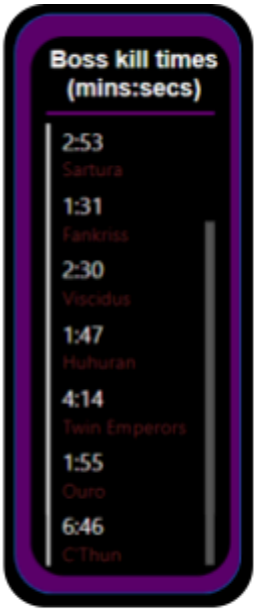


Figure 5.1: Slowest raid by Praxis. Time taken to kill some of the bosses.

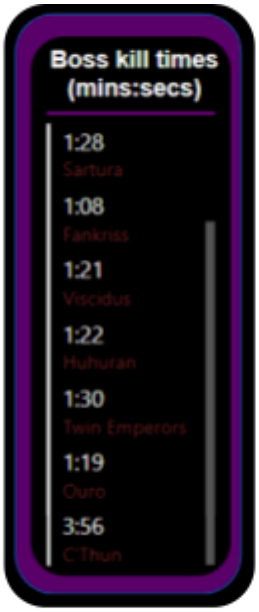


Figure 5.2: Fastest raid by Praxis. Time taken to kill some of the bosses.

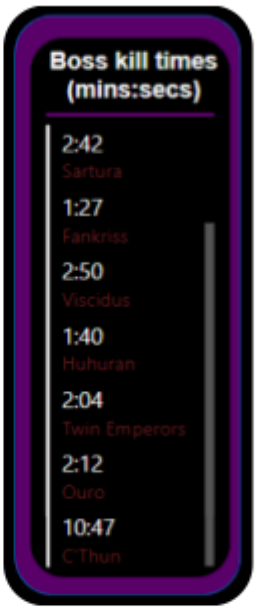


Figure 5.3: Slowest raid by ZØMBIES . Time taken to kill some of the bosses.

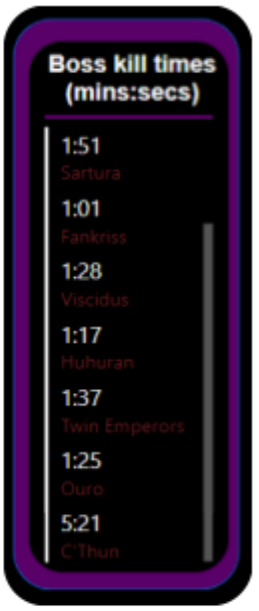


Figure 5.4: Fastest raid by ZØMBIES. Time taken to kill some of the bosses.

**World buffs:**

World buffs are similar to consumables in that they benefit characters and are lost upon death. However, their effects are typically much better than those of consumables and thus are considered of paramount importance to clearing a raid zone quickly. In both the slowest

and fastest raids by each guild, not a single buff is missing. This is likely due to the introduction of consumable-like world buffs once AQ40 was released into the game.

The “consumable” can be purchased and used to provide all players in proximity a world buff effect identical to the original version. As a result, it is a rarity for players to be missing any world buffs since the equivalent “consumable” is typically used at the beginning of a raid. From both the fastest and slowest reports for both guilds, all world buffs are present (Figures 6.1, 6.2, 6.3 and 6.4). This reinforces the importance of world buffs in raids. However, due to the absence of any variation in this metric, it is challenging to ascertain the level of influence world buffs have on overall efficiency.

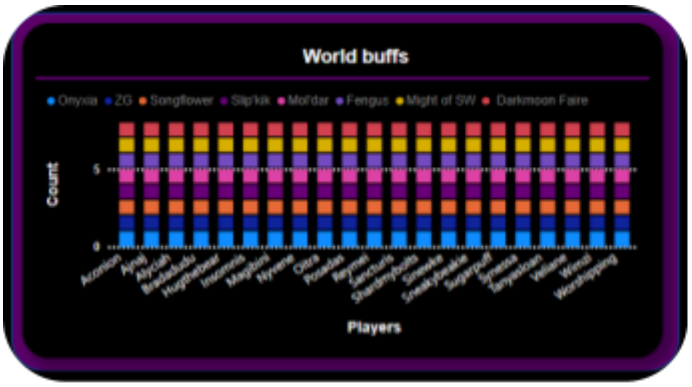


Figure 6.1: Slowest raid by Praxis. World buffs on players.

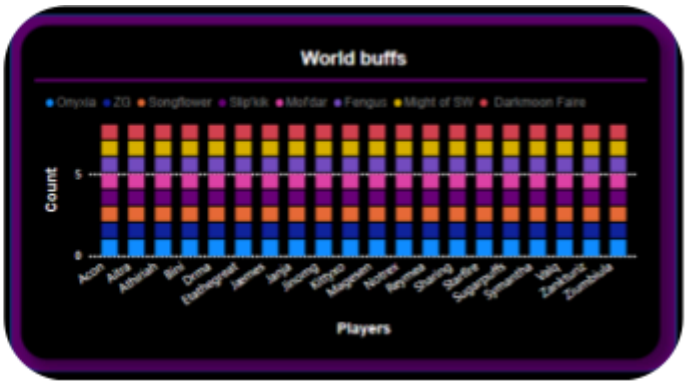


Figure 6.2: Fastest raid by Praxis. World buffs on players.

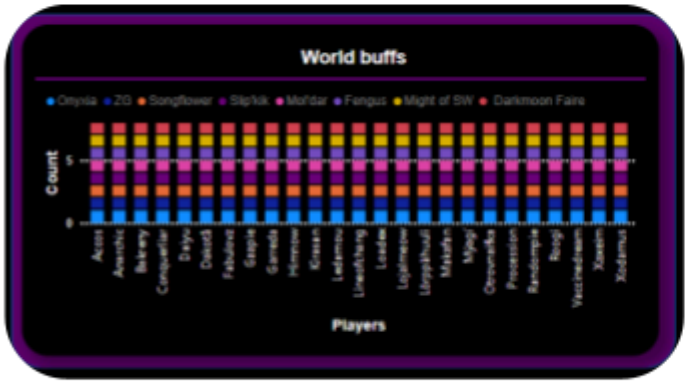


Figure 6.3: Slowest raid by ZØMBIES. World buffs on players.

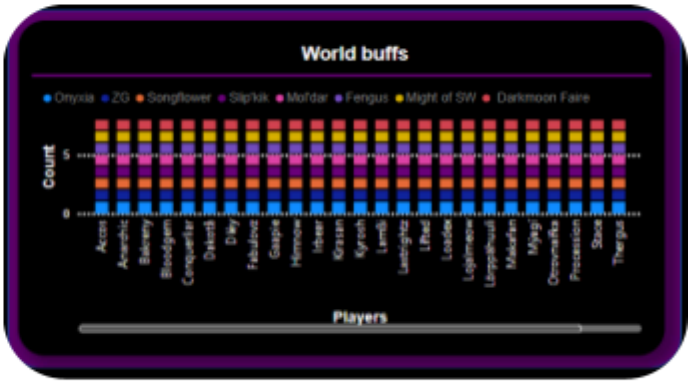


Figure 6.4: Slowest raid by ZØMBIES. World buffs on players.

## Recommendations and conclusion:

The analysis of the contrast between the fastest and slowest AQ40 clearances by Praxis and ZØMBIES has elucidated areas of focus for guilds seeking to improve their performance. For

deaths, it is crucial to address any raid-wide issues that may cause multiple deaths at a time as these may very quickly increase the total death count and result in downtime for player recovery. The consumables data underlines the value of invulnerability potions in faster raids, but this is likely linked to increased damage output. As a result, guilds that have not reached the stage of higher invulnerability potion use should try and place more value on offensive consumables to increase their damage-dealing capabilities.

Parses, although valuable in assessing a player's performance during boss encounters, are effectively useless when evaluating a player's raid performance holistically. Other metrics such as the damage dealt or healing provided throughout the entire raid zone would be far more useful to determine overall player performance. Indirectly, the evaluation of parses and boss kill times have underlined the importance of player performance when not engaged in combat with a boss. For any guild, from amongst the best in the world like Praxis or an average guild like ZØMBIES, the most probable solution to a more efficient performance primarily lies in the optimisations between bosses.

## Limitations:

A limitation that needs to be strongly considered is the small number of reports used to derive conclusions. With fewer reports, deductions are more likely to be affected by anomalies. The conclusions in this analysis focus on the adjustments made by the guilds Praxis and ZØMBIES. Trends can be more thoroughly tested by evaluating multiple guilds. In doing so, a broader variety of recommendations can be made, as different guilds may differ in their approach and tactics. Furthermore, with enough guilds being explored, perhaps recommendations could be ranked in terms of their likelihood to improve guild performance.

Another limitation is the players found in the reports themselves. While the reports are acquired from guilds, the same players may not participate in each raid. Additionally, the total number of players participating in each raid may fluctuate. These are both factors that can certainly affect the efficiency of a guild's performance and so any conclusions drawn from visualisations should be mindful of this fact. Also, new players may join a guild to participate in a raid and consequently skew data. For instance, in the fastest raid by ZØMBIES, the player "Irbear" had just joined the guild and produced parses all below 50 while dying the second most of any player in the group. However, with enough reports being evaluated, these anomalous cases will have less bearing on the actionable recommendations a guild may deduce.

Raid composition is also a critical factor that this analysis does not account for. Certain character types complement others in terms of their ability to deal damage. Therefore, by bringing a certain number of each character type, a guild can optimise its damage output. However, it should be noted that this area can be investigated further if minimal flaws are observed in the other metrics like: player deaths, parses and consumables. The reason for this is that in guilds with a limited number of players, it is much more realistic to manage the aforementioned variables compared to the complete restructuring of a guild's players.