Temporal Patterns and Agent Influence on Player Sentiment: Analysis Based on Valorant Reddit Discussions

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Abstract

This study investigates the impact of playtime, agent characteristics, and game patches on players' sentiment within the *Valorant* game community. The research leverages data from the Reddit, r/*Valorant* subreddit, to form the database. The objectives for this research include an analysis on how playtime (weekday vs. weekend) influences players' toxicity, the correlation between agent characteristics (e.g. race, gender) with players' toxic discourse, and the effects of one recent patch on players' sentiment. Using Detoxify, an open-sourced natural language processing (NLP) sentiment analysis tool, the research identified biases in players' discussions linked to agent races and notable shifts in players' sentiment after the game patch. The findings highlight the complexities of player-agent interactions through game *Valorant* and provide actionable insights for game designers and community managers to foster more balancing, inclusive and engaging gaming environments.

Keywords

Game Design, Player Behavior, Online Communities, Player Psychology, In-Game Behavior

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1 Introduction

Valorant is a multiplayer, team-based, first-person shooter game where players select characters, known as agents. Each agent comes with fixed weapon types and unique abilities. Teams are composed of players who collaborate to combat an opposing team, with each team typically featuring agents of various roles to facilitate smooth gameplay. In every round, players independently choose their agents, making agent selection a crucial aspect of the game. Player emotions in *Valorant* are often shaped by gameplay scenarios, such as match outcomes or individual character performance, which significantly influence their tone and mood in online discussions.

This study explores three sub-questions that delve into the relationship between *Valorant* players and agents:

(1) In the game "*Valorant*," when players choose the same agent, how does game-playing time (weekday vs. weekend) affect their emotions during the match?
(2) In terms of toxicity, identity attacks, and sexual explicitness in comments on r/*Valorant*, how does this correlate with the race of the agent mentioned?
(3) How did the 10/22 Patch Notes 9.08 updates on *Gekko* impact players' sentiment and discussion dynamics in *Valorant*, and did these changes influence the other agents within the initiator role? (*Gekko* is weaken)

To address these questions, we categorized agents into groups based on race, gender, outfit, and team position for more generalized results.

This research seeks to contribute to multiple fields, including game design, player psychology, and the management of online gaming communities. The findings aim to assist game developers in designing experiences that enhance player engagement while reducing potential negative emotional impacts. Furthermore, this study provides insights into the intricate relationship between virtual experiences and real-world behaviors, offering valuable perspectives for understanding the dynamics of online forums and gaming ecosystems.

Using the Reddit API (PRAW), we collected posts and comments from the subreddit dedicated to *Valorant*. The dataset includes metadata such as post titles, content, timestamps, authorship, and upvotes, focusing on recent posts to capture current trends and discussions.

We applied Natural Language Processing (NLP) techniques to preprocess and extract key features:

- Temporal Context: Posts were categorized as "day" or "night" and "weekday" or "weekend" based on timestamps.
- Game-Specific Information: Posts were analyzed for mentions of game modes (e.g., competitive or casual) and agent roles (e.g., Duelist, Controller, Sentinel, Initiator). Agents were also grouped by race, gender, and nationality.
- Hatefulness Analysis: Using Detoxify, we obtained toxicity scores across metrics such as toxic, severe toxic, obscene, threat, insult, and identity hatred.

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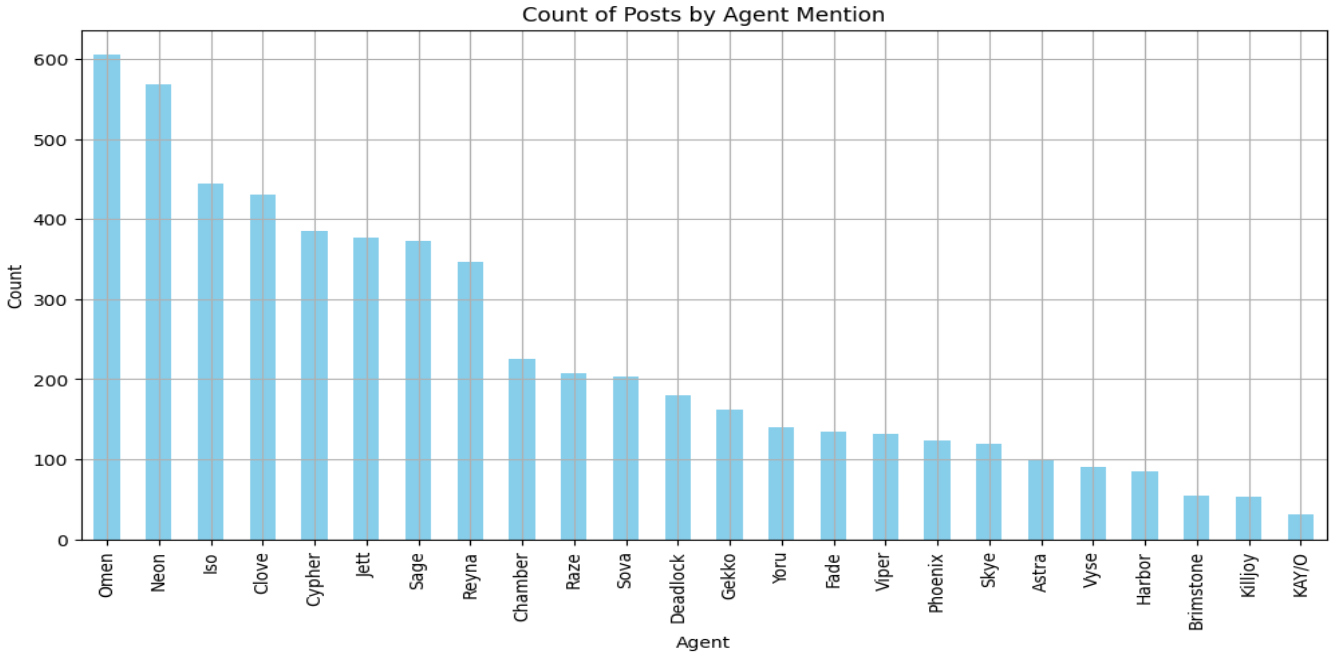

Figure 1: The Number of Posts categorized by Agent

2 Related Work

The research on character and mechanism design in games has grown in popularity with the widespread use of the internet. Researchers have increasingly focused on how players' emotions are affected by different aspects of game design, with some studies examining specific games and others exploring broader trends in player-character relationships.

2.1 Player Emotions and Character Design

Studies have shown that game characters significantly influence players' emotional responses and overall satisfaction. Fardy Andreean et al. found that aesthetic design, character strength, and narrative elements foster emotional attachment, enhancing player motivation and engagement. Similarly, Erb et al. highlighted the importance of player-character relationships in "The Last of Us Part II," demonstrating that players' emotional connections to characters directly shape their gaming experiences. These findings suggest that character design is crucial for enhancing player enjoyment, which is particularly relevant to our study of *Valorant*'s character design and it impact on player emotions.

2.2 Multi-player Game and Player Interaction

Research on multiplayer games uses diverse methods to explore the complexities of player interactions. Abramov et al. analyzed e-sports tournament data by collecting game logs and audio recordings, using machine learning to classify emotions and correlate them with team performance. This approach demonstrated the possibility of our method of analyzing player discourse in *Valorant*. Ahlgren and Rizal conducted a qualitative comparison of character design in League of Legends and *Valorant*, examining how elements like voice lines and abilities influence player-character relationships. Alexander and Hidayat utilized mixed methods, combining surveys and interviews to evaluate how perceived quality and enjoyment affect player satisfaction in *Valorant*.

Despite the breadth of existing research on player's relation to in-game characters, we find that studies on how a character's personality and action design directly affect player emotions are not widely discussed. Most research focuses on the aesthetics of characters or how different types of gameplay modes affect player experience. Our study aims to fill this gap by examining how specific character designs in *Valorant* influence player emotions and discourse. Unlike previous studies that utilized surveys or one particular study used real-life gameplay audio for sentiment analysis, we connect with the readings in the course and use Reddit discussion threads as our sentiment source. This approach allows us to focus on player discussions about specific characters, providing a novel perspective on the relationship between character design, playing time, and player emotions in *Valorant*.

Additionally, the usage of Reddit forums allows us to explore how character design can foster community interactions and contribute to creating a healthier gaming environment. We aim to provide insights that can help developers promote positive message within the gaming community.

3 Data

3.1 Data Collection via Reddit API

The first step of the study involves collecting data from *Valorant*-related discussions on Reddit. We utilized the Reddit API (PRAW) to extract posts and comments from the *Valorant* subreddit. This process gathers both textual content (post titles and comments)

and associated metadata, such as submission timestamps, author usernames, and engagement metrics (e.g., upvotes). The API allows for continuous access to real-time data, ensuring that our dataset remains relevant to current discussions.

We collected the data from all posts and comments between the date of September 20, 2024 to November 2, 2024 from the r/*Valorant* community.

3.2 Data Preprocessing and Feature Extraction

After forming the database, the raw data undergoes preprocessing using Natural Language Processing (NLP) techniques to prepare it for analysis. This stage includes:

- Text Cleaning: Removing extraneous elements such as special characters, emojis, and common stopwords that do not contribute to the analysis of sentiment or player discourse.
- Feature Extraction:
  - Temporal Features: Posts and comments are categorized based on their timestamp into "day" or "night" and "weekday" or "weekend" to explore whether the timing of discussions impacts the emotional tone or content of the conversation.
  - Game-Specific Information: We examine posts for references to *Valorant* agents and their roles (Duelist, Controller, Initiator, Sentinel). If multiple agents or roles are mentioned, the data is expanded to capture each agent/role association for proper analysis.
  - Gender and Race: We manually assign the gender and race of agents, base on the background story of the game.
- Toxicity Analysis: We apply Detoxify, which is a Toxic Comment Classification Transformer trained on data from Civil Comment Platform, and Wikipedia. The model produce multiple scores with value from 0 to 1, for toxic, severe toxic, obscene, threat, insult, and identity hatred for the text input. Which we can use to further determine the hatefulness of the Reddit comment or post.

4 Method

4.1 Toxicity to Weekend/Weekday

For RQ1, we want to investigates how people's commenting time (weekday vs. weekend) affects player's emotions in community discussion, when choosing the same agent. One of our hypothesis is that players who are active on the *Valorant* community might exhibit higher levels of aggression on weekends due to an increase in the number of participants, which could lead to more inexperienced or gameplay. We originally aimed to also discuss the influence of night and day, however due to limitations with Reddit API, we instead commit to assuming all post are in CST.

We first categorized player's discussion into weekday and weekend. Then we analyzed their behavior by applying t-test to identify significant differences in the seven toxicity scores between the two groups. We then visualized the comparison.

4.2 Toxicity to Race of Agents

For RQ2, we want to explore the correlation between toxicity, identity attacks, and sexual explicitness in comments on r/*Valorant* and the race of the agents mentioned.

We first visualize in separate graphs, the differences in each of the seven toxicity scores, among racial categories. A Welch ANOVA test was conducted across the seven toxicity to determine whether there were statistically significant variations based on race. After identifying significant metrics, we selected specific scores to perform a qualitative analysis by examining the comments with high scores. And we observe the types of toxic language towards characters of different races.

4.3 Effect on Character Skill Update

For RQ3, which assesses changes in sentiment before and after a patch update for the agent Gekko, we employed several analytical approaches:

- Sentiment Distribution: We visualized the distribution of sentiment and hate scores using density plots or boxplots to highlight variations.
- Emotion Shifts: A breakdown of specific emotions (e.g., positive, negative, neutral) was conducted to assess whether the patch resulted in more positive or negative sentiments.
- Time Series Analysis: Sentiment and hate scores were plotted over time post-patch to identify trends, such as initial negative reactions transitioning to more positive or stable sentiments.
- Cumulative Sentiment Change: We created cumulative sentiment and hate score plots to track how player attitudes evolved over days or weeks after the patch.
- Initiator Role Comparison: The sentiment and hate scores for other initiator agents (e.g., Skye, Sova, KAY/O) were compared to Gekko to determine whether players shifted their focus or expressed differing emotions toward other initiators due to the changes made to Gekko.
- Topic Modeling: Using Latent Dirichlet Allocation (LDA), we identified key discussion topics about Gekko before and after the patch. This analysis revealed shifts in discourse, such as moving from general gameplay to specific patch effects, strategies, or complaints.

5 Result

5.1 Toxicity to Weekend/Weekday

In the game "*Valorant*," when players choose the same agent, how does game-playing time (weekday vs. weekend) affect their emotions during the match? To explore the effect of game-playing time on player emotions, we conducted statistical analyses using toxicity metrics. The results showed that certain toxicity metrics are significantly influenced by the time of gameplay, while others are not. Table 1 summarizes the p-values and their significance.

The results demonstrate that toxicity, severe toxicity, obscene, and identity attack metrics are significantly influenced by the weekday and weekend. In contrast, metrics such as insult, threat, and sexual explicitness do not show statistical significant. In Fig. 2, we

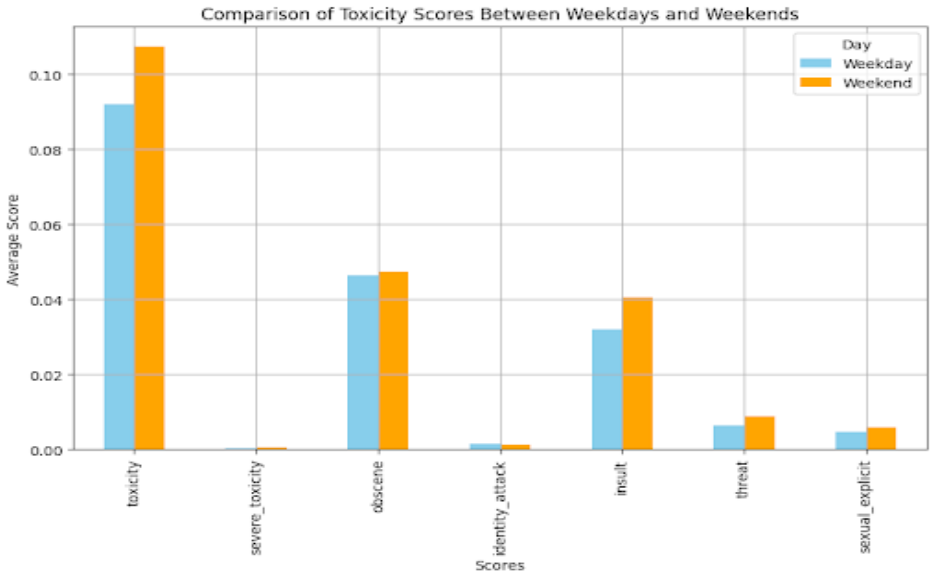

Figure 2: The Average of Toxicity Scores by Weekday and Weekend

Table 1: Effect of Time on Sentiment Scores

Toxicity Metric	p-value	Significance
Toxicity	0.0128	Significant
Severe Toxicity	0.0359	Significant
Obscene	0.0285	Significant
Identity Attack	0.0495	Significant
Insult	0.1366	Not significant
Threat	0.2012	Not significant
Sexual Explicit	0.0503	Not significant

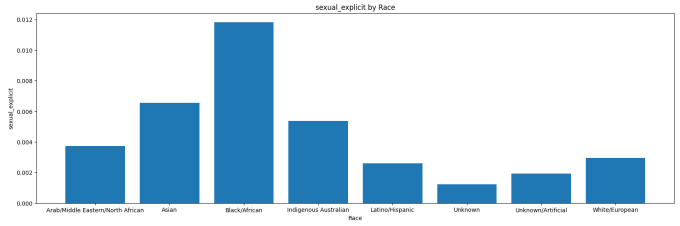

Figure 3: The Average sexual explicitness among Agent's Race

showed the average of different toxicity scores on weekends and weekdays respectively.

5.2 Toxicity to Race of Agents

In terms of toxicity, identity attacks, and sexual explicitness in comments on r/*Valorant*, how does this correlate with the race of the agent mentioned?

5.2.1 Statistical test. A Welch ANOVA test was conducted across seven toxicity scores to identify differences in player sentiment based on the race of the agents mentioned in discussions. Results indicate that toxicity and insult scores show statistically significant differences.

5.2.2 Qualitative observation. To better understand these differences, a qualitative analysis was performed by understanding comments that were high in certain toxicity values. The findings reveal are summarized below:

Though statistically insignificant, we made interesting observations from comments with higher sexual explicitness. Discussions about Black characters often focus on their physicality with sexual undertones.

- "When u rez Astra she literally says 'my ancestors said wassup!' she does not belong there with Vyse no personality havin ass."
- "Every teammates that I played with always feel pleased with my suck (licking emoji)."
- "That's a skill u'll have as an Astra main: Becoming good at sucking and stunning."

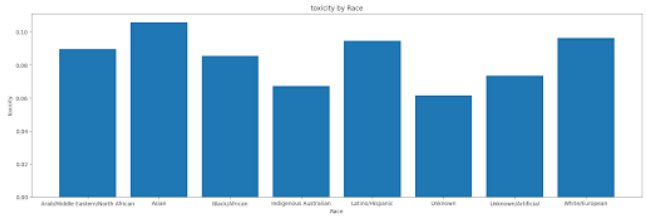

Figure 4: The Average Toxicity among Agent's Race

And although statistically insignificant, we also found surprising information in comments with high identity attack scores. Identity

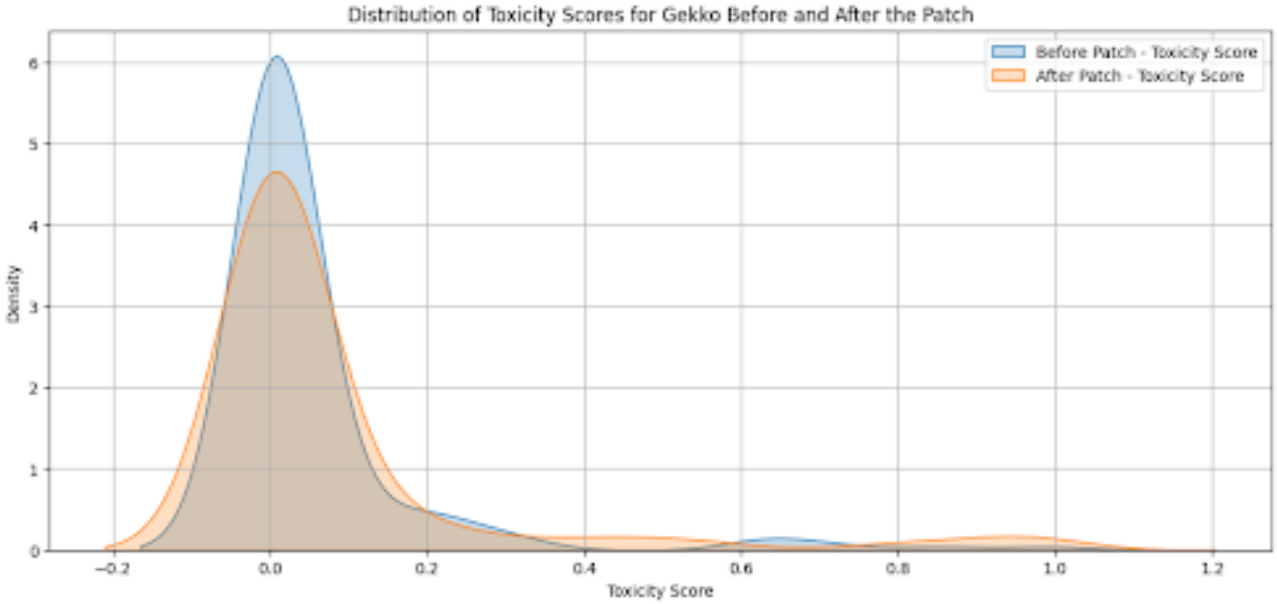

Figure 5: Distribution of Toxicity Scores for Gekko Before and After the Patch

attack content differences between Latino/Hispanic Characters and White/European Characters.

Discussions of Latino agents often carry a more negative tone, particularly around queerness.

- "Sage mains are either the nicest people or the most annoying… started out the game saying 'are y'all not coming because we're gay.'"

Comments on White agents are more inclusive and often emphasize empathy and acceptance.

- "When you intentionally misgender a videogame character, you create an environment where it's normal to misgender people, even real ones."

Asian Characters: Asian agents are often the target of derogatory language, with frequent references to them as "stupid" or "idiotic."

- "THIS IS SO REAL CAUSE FCK ISO AND HIS STUPID SHIELD."
- "Idiots"-yoru every other voice lines.

5.3 Effect on Character Skill Update

5.3.1 Detailed Sentiment and Hate Score Analysis. In Figure 5, the toxicity scores before and after the patch show a significant reduction in overall toxicity after the patch. The sharper peak for the "after patch" distribution indicates a more uniform, less toxic discussion environment.

5.3.2 Temporal Analysis of Sentiment and Hate Scores. In figure 8, The toxicity score for Gekko before the patch starts relatively high above the average toxicity score, but steadily declines, indicating that initial frustrations or disagreements about Gekko's design were gradually alleviated even before the patch was implemented.

We want to note that the empty period in Figure 8 was an intentional choice since between October 13 to October 21, some players

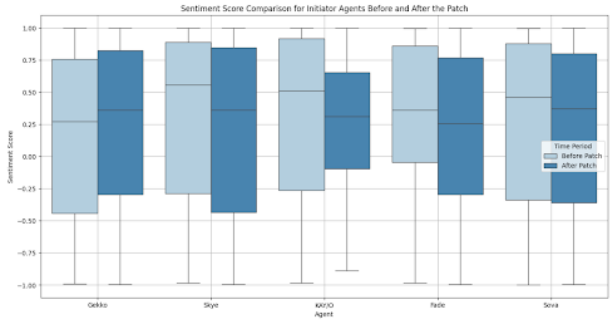

Figure 6: Sentiment Score comparison for Initiator Agents Before and After the Patch

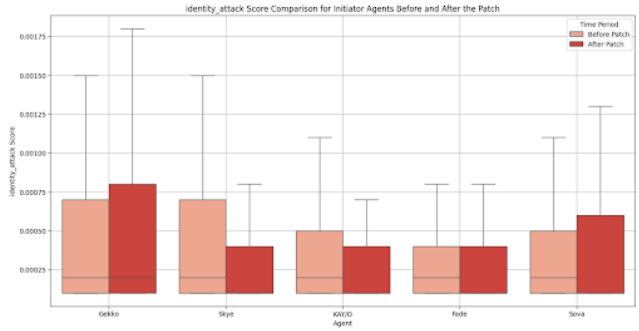

Figure 7: Identity Attack Score Comparison for Initiator Agents Before and After the Patch

were playing the patched Beta version of *Valorant*, while others

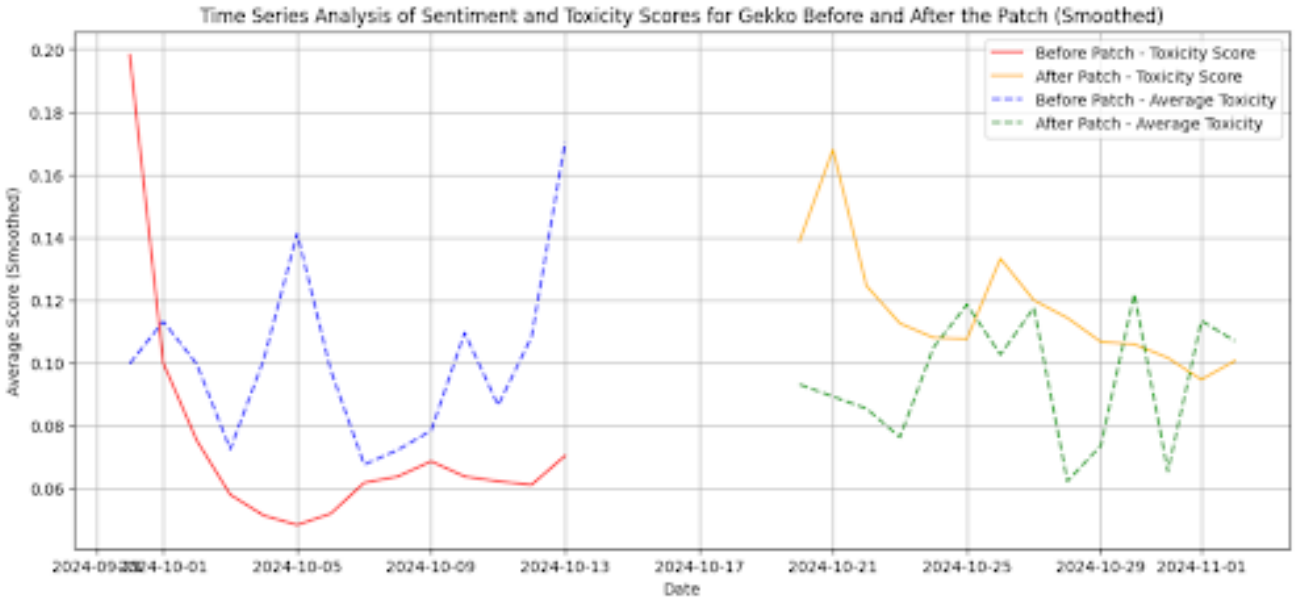

Figure 8: Time Series Analysis of Sentiment and Toxicity Scores for Gekko Before and After Patch

were still on the previous version. After October 22, all players were updated to the latest, patched version.

5.3.3 Role-Based Impact Analysis. In Figure 7, the identity attack scores for Gekko increased slightly after the patch, suggesting that the patch brought mixed emotions, potentially due to debates on balance changes. For other initiators (e.g., Skye, KAY/O, and Fade), scores drop lower or remain relatively consistent before and after the patch. This stability indicates that the patch may not have drastically shifted sentiment toward other initiators but rather concentrated player reactions on Gekko.

This particular analysis was conducted to better understand how the update on one of the agents in the initiator position, may affect other agents of the same position since all teams must contain agents of certain positions during combats.

5.3.4 Content-Based Analysis. Keyword Analysis: Analyze common keywords or phrases used in comments mentioning Gekko before and after the patch. This can help pinpoint what specific aspects of the patch (e.g., "Dizzy," "Wingman") are driving emotions.

Before the Patch: Discussions seem to focus more on general gameplay, agent performance, and team dynamics. The top keywords include "game," "play," "team," and mentions of various agents (e.g., "Cypher," "Omen," "Neon"). After the Patch: There is a noticeable shift towards discussions about Gekko's specific abilities and their impact. Keywords such as "Dizzy," "Wingman," and "ult" indicate that players are engaging more with the details of the patch changes and how they affect gameplay. Discussion of Patch Impact: Keywords such as "Dizzy" and "Wingman" after the patch suggest that players are analyzing how Gekko's abilities function and whether they have been improved or weakened. This indicates that the patch likely led to a deeper evaluation of how these abilities affect match outcomes. Words like "get," "use," and "hit" imply that players are discussing the practical effectiveness of using these abilities post-patch.

6 Discussion

6.1 Summary

In this research, we collected posts and comments from the *Valorant* subreddit spanning September to November. We analyzed the data to extract information about the agents being discussed and the tone of these discussions. Using the Detoxify model, we obtained toxicity scores across seven different aspects.

Our first question was: how do weekend and weekday discussions differ in toxicity? Does player discourse change based on the day of the week, and how might that influence game design? Using a t-test, we found that toxicity, severe toxicity, obscene language, and identity attack metrics were significantly influenced by whether gameplay occurred on a weekday or weekend.

Our second question was: how does the agent being discussed correlate with the toxicity of the content? Do players exhibit racial biases during online discourse? Are there unaddressed issues within the gaming community? To investigate, we conducted a Welch ANOVA test and examined the top comments for each toxicity score. While only the toxicity and insult scores showed statistical significance, deeper analysis revealed notable patterns. For instance, the sexual explicitness score was unusually high for discussions about a particular female African character. We also noticed distinct tonal differences when the discourse involved the queer community or compared Latino and white characters.

Our third question focused on a specific game patch released on October 22, 2024. We explored how changes to one character's abilities influenced player discourse about him. This analysis aims

to provide game developers with insights into how in-game changes impact community sentiment outside the game.

We uncovered several interesting findings. First, we examined the distribution of toxicity scores and observed that before the patch, discussions were more neutral. After the patch, where the character Gekko was weakened, the conversations became more nuanced. Second, we analyzed the time-series changes in toxicity, noting a sharp rise in toxic discussions immediately following the patch, reflecting player frustration over the update. Third, we looked at how this change affected discussions about other agents. Since *Valorant* is a team-based game, weakening Gekko might encourage players to rely on other agents in similar roles. For these agents, some discussions became more neutral, while others grew more nuanced. Lastly, we delved into what players were saying about Gekko specifically. Before the patch, discussions largely centered around team strategies involving Gekko. After the patch, conversations shifted to how players could adapt to his altered abilities.

6.2 Possible Implication

From our results, we've identified a few potential implications.

First, observing that certain toxicity scores were statistically significant between weekdays and weekends gives us the idea that the Reddit community likely consists of more involved players—those who are more experienced and possibly more skilled. During weekdays, it seems like more dedicated players are active, whereas weekends attract casual players who may only play occasionally. For skilled players, the presence of casual players might be perceived as a disruption, leading to increased toxicity in the community.

From our second experiment, the results suggest there might still be underlying racial biases within the gaming community, particularly in how players discuss characters of different races. We noticed patterns where players seemed to dehumanize characters of certain races or express less sympathy when discussing them. This might reflect a broader issue in the real world, where racism remains a relevant topic that deserves further exploration and study.

Lastly, by comparing toxicity levels before and after a particular game patch, we found noticeable changes in player discourse—not just about the updated agent but also about other agents who share the same role as Gekko. Our findings highlight that Reddit could serve as a valuable resource for gaming companies when evaluating the effects of game patches. It offers insights into player emotions that traditional methods of user experience analysis might not fully capture.

6.3 Limitations

- Variations in Agent Naming Agent names in casual discussions often deviate from official naming conventions. For example, *KAY/O* might be referred to as *K.O.* or other simplified forms. These variations can reduce the accuracy of our analysis, as agent mentions may be undercounted or missed entirely, leading to incomplete insights into how often agents are discussed.
- Toxicity Scores May Not Always Align with Our Goals While Detoxify uses a transformer model to calculate toxicity scores based on entire posts or comments, we found that the scores didn't always accurately reflect the tone toward specific agents. Instead, they often captured the overall gaming experience. This discrepancy makes some of our assumptions and analyses less reliable. In the future, we hope to address this by exploring alternative scoring models, potentially ones based on large language models, or by refining our preprocessing steps.
- Timezone Limitations Due to the Reddit API's use of GMT timestamps, we couldn't account for the local time of posts and comments. This prevented us from analyzing specific times of day and could lead to minor misclassification of weekends and weekdays in certain regions. However, we believe this issue is minimal and doesn't significantly affect our results.
- Challenges with Timing A time gap may exists between actual gameplay occurs and when related posts appear on Reddit. This gap could introduce inaccuracies in our analysis by disconnecting player emotions from the actual gameplay events.
- Bias from Echo Chambers Reddit communities often function as echo chambers, where certain opinions are amplified while others are suppressed. This dynamic might skew our data and limit the diversity of perspectives in our analysis.
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7 Conclusion

Our research explored the dynamics of player sentiment and toxicity within the *Valorant* game community, focusing on temporal patterns, racial and gender biases, and the effects of a patch update on community discourse. These findings would offer valuable insights for game developers and community managers, polishing the game design framework to create more balancing, inclusive and positive gaming environments.

7.1 Players' Toxicity Analysis

The analysis of toxicity metrics revealed that players' sentiment would be significantly influenced based on the timing of gameplay. Compareing to weekdays, discussions during weekends show a higher levels of toxicity, severe toxicity, obscenity, and identity attacks. This discovery suggests that increased player activity during weekends, which may involving a mix of experienced and casual players, would contribute to frustration and negative discourse because of the level gap between players. These findings emphasize importance of game designers in drawing experience distinctions between groups of players, providing a framework for targeted moderation strategies.

7.2 Racial and Gender Biases Towards Different Agents

One highlight of our study is uncovering significant difference in how agents are discussed based on their race and gender, which is always a problem in the game community. The agents' character, who's race in Black, gender in female were frequently receiving sexualized and racially charged comments. Latino agents experienced negative tones in discussions, and Asian agents were frequently targeted with language suggesting incompetence. These findings

highlight the need for addressing bias in gaming communities and improving representation in game design.

7.3 Patch Effects on Sentiment

The research discussed the influence from one patch, which weakened the abilities of the agent Gekko, to players' sentiment and discussion. Toxicity levels of comments on agent Gekko reaching a peak immediately after the patch officially released. These toxic words indicating initial dissatisfaction with the patch's changes. Over time, however, players adapted to the changes and sentiment were stabilized. The patch also influenced players' sentiment toward other agents in the same role, with more neutral or favorable discussions.

7.4 Future Work

Base on our researches, more future works could be extended. Aiming to form a more game-related database, in-game text discussion related to agent played could be leveraged to replace the Reddit API data. Integrate behavioral metrics from in-game logs could better correlate in-game events with community discussions. Using alternative sentiment analysis models could provide deeper insights into how specific game features influence toxicity and sentiment.

8 Contribution Statement

Here are our contributions to the project:

I engaged in all stages of the teamwork, including presenting our initial proposal, participating in the brainstorming of three RQs and their continuous iteration, and the implementation of the RQ1 and RQ2. My main contribution across the project is that I solidly worked in the data analysis, model running, code implementation and result transition for the first 2 RQs. In addition, I actively communicated with peers with respect to fault fixes, feedback gathering and approach improvement.

- Ideation: I actively participated in developing the project's ideas and defining its scope.
- Formulation: I contributed to discussions and built the framework for analyzing three research questions to achieve our goals
- Execution: I implemented the main pipelines to solve and analyse RQ1 and RQ2.
- Presentation: I presented our initial idea during RP-1 and participated in advice gathering and question answering in all check-point sessions.

Nai-Syuan Chang: I played a role in brainstorming potential problems and solutions for the project, as well as presenting our progress during RP sessions. I contributed to writing and organizing key sections of the report, including the related works, methods, results, and discussion, using data and findings from teammates' experiments. Additionally, I documented meeting summaries, incorporated professors' feedback, and suggested potential improvements to my team members' approaches.

- Ideation: I actively participated in developing the project's ideas and defining its scope.
- Formulation: I contributed to discussions and conducted research to identify methods to achieve our goals.
- Execution: I was responsible for extracting toxicity scores using the Detoxify model.
- Presentation: I created slides and posters for RP sessions and took the lead in presenting our work.

Chentai Yuan: I brought up the initial idea for the project, brainstorming three RQs, as well as building frameworks on methods to solve these RQs. I am responsible for forming the database, data preprocess and the implementation research for RQ3. I contributed to writing and organizing of the report, including the abstract, RQ3 related analysis, results, discussion, and the conclusion. Additionally, I actively engaged in presentation, showing our research progress and achievements.

- Ideation: I brought up the initial idea of the project, actively engaged in developing three research questions.
- Formulation: I contributed to discussions and built the framework for analyzing three research questions to achieve our goals.
- Execution: I was responsible for building Reddit API database, database pre-processing, and exploration on RQ3.
- Presentation: I actively engaged in presentation, and contributed to database description and RQ3 achievements presentation.

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(8) We used the prompt "How to cite in CHI format?" to guide our citation, using Perplexity (https://www.perplexity.ai).

We adapted this into our own citation format that also includes prompt used.

(9) We used the prompt "Can you check the grammar and spelling of this xxx section in our research on *Valorant* gamers?" (replace xxx with Abstract, Introduction, Related Work, Reflection) to smooth out the sentences and fixes generic grammar and spellings, using Perplexity (https://www.perplexity.ai). We adapted this into our final writing with comparison to our original content, to avoid extra information being hallucinated.

(10) We used Grammarly (*https://www.grammarly.com*) for checking grammar and spelling of the writing before final submission.