

Investigating Player Engagement and Character Popularity Using YouTube Data Analysis

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Abstract

This study investigates player engagement and character popularity within the mobile game "Honkai: Star Rail" through the analysis of user-generated comments on YouTube. By employing the YouTube Data Application Programming Interface, 5,771 online textual reviews from the official trailer "Monodrama" were collected and analyzed using Voyant, a text analysis tool. The findings highlight that player exhibited significant emotional engagement and expressed strong positive sentiments toward characters, particularly focusing on the newly introduced character "Sparkle". The frequent mention of "Kurumi," a character from another media franchise, indicated associative engagement, suggesting players connect new characters with familiar designs. Terms relating directly to gameplay mechanics, such as "pull" and "fix," were prominently discussed, demonstrating the players' active interest and feedback regarding game functionality and improvements. Additionally, informal and expressive language observed in comments reveals players' deep emotional investment and community-driven interactions. This study contributes to existing literature by highlighting the importance of visual and emotional design elements in character-driven engagement within gacha games. The practical implications offer valuable insights for game developers and marketers, emphasizing the significance of distinct and relatable character designs for maintaining player interest and monetization potential. Despite limitations such as dataset scope and absence of demographic data, this research underscores the effectiveness of social media platforms in analyzing gamer engagement.

Categories: Consumer Behavior, Social media and customer relationship management, Digital Marketing

Keywords: player engagement, online textual review, youtube comments, emotional engagement, social media analysis

Introduction

The global market of gaming industry is growing exponentially, and predictions show that this area will soon be quite promising in terms of revenue and number of players (Palma-Ruiz et al., 2022). According to recent predictions, between 2024 and 2029, global revenue in the gaming industry will only increase every year. Experts estimate that at a new peak in 2029, the revenue in the industry will reach more than 691 billion US dollars, which indicates the increasing popularity of games and the willingness of people (customers) to spend their money (Statista, 2025). Furthermore, the world of video games is very diverse. For instance, if we look at the 2024 statistics for the mobile games that have highest grossing in the past year, we can see two games: "Honkai: Star Rail" with more than 596 billion of US dollars and "Genshin Impact" with more than 513 billion of US dollars (Statista Mobile Games, 2025). These two games were developed by Chinese company "Hoyoverse" that "is committed to provide immersive virtual world experiences to players around the world" (HoYoverse, 2025).

After "Hoyoverse" released "Honkai: Star Rail" in April 2023, it quickly surpassed more than 10 million downloads on Google Play alone (Honkai, 2025). This statistic shows how engaged and interested people are in the game. One of features of this game is gacha mechanics, where people can get any character that is up on this game at the moment. This mechanic links player engagement and character popularity (Xi, 2024). Moreover, during the 2025 Game Developers Conference, the lead game designer of "Honkai: Star Rail" claimed that character design comes before combat design (Polygon, 2025). This indicates that characters have a huge role in players' engagement. Additionally, (Bankov, 2019) mentioned that players usually use different social media to express their preferences and other emotional responses, and accordingly, this could also drive the games' popularity.

Understanding players engagement and character popularity in games requires the investigation of different factors such as game experience, community interaction, and emotional responses. Research by (Shi et al., 2024) shows that game experience and community interaction affect gamers' satisfaction and engagement. Also, emotional experiences during gameplay have an impact on player engagement (Albatati et al., 2023). In addition, (Kirschner and Williams, 2014) demonstrate that gameplay reviews found on social media serve as indicators of player engagement, as they capture emotional reactions to game elements, including characters.

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While player engagement and character popularity are widely studied within the gaming industry (Shi et al., 2024) (Albatati et al., 2023) (Kirschner and Williams, 2014), most of this research focuses on gameplay experience, community interaction, or emotional responses to game mechanics. Existing research has also highlighted the role of social media in reflecting fans' emotions and preferences (Bankov, 2019). Despite the growing success of gacha games such as "Honkai: Star Rail", there is a noticeable lack of research examining gacha fans' engagement and character popularity through content created by fan communities on social media. Particularly, how character design and presentation influence players' reactions and engagement in gacha-based games has received limited academic attention. This study addresses this gap by analysing the YouTube comment section related to "Honkai: Star Rail", offering insights into fans' engagement, emotional responses, and reactions to newly released characters. Therefore, the study demonstrates how different characters in games and fan-driven social media content influence players' engagement, which is crucial for game developers. Based on this research gap, the study aims to answer the following questions: (1) how players' engagement is shown and expressed in the YouTube comment section, and (2) what valuable insights developers can gain from it.

Literature review

Player's Engagement

According to the conceptual framework proposed by (Aldous et al., 2023), engagement as a holistic process can be divided into four distinct stages: point of engagement, period of engagement, disengagement, and re-engagement. Although all of these stages are important for analysing gamers' engagement, this article focuses on only two of them. The point of engagement refers to the moment initiated by the resonance of several factors, such as aesthetic, someone's recommendation, and general composition of content. This idea is also supported by (Wiebe et al., 2014), who highlight the role of visual appeal and perceived usability. The period of engagement is described as the process when something can catch your attention and interest with a help of different features, including feedback and a sense of control over the interaction (Aldous et al., 2023). These stages of engagement are mainly sustained by the pleasure that the individual derives from any experience gained. As the article suggests, the process of engagement is related to the concept of multidimensional pleasure that comes from a few dimensions: physiological, affective, and cognitive (Vorderer et al., 2004).

Essentially, players' engagement translates into monetisation potential. A study by (Hamari, 2015) shows that "perceived enjoyment of the game is positively associated with continuous use intentions for the game" and "continuous use intention for the game is positively associated with purchase attitude towards buying virtual goods". These two hypotheses reveal a pathway through which engagement and enjoyment connect with the willingness to spend money. Fans' engagement is closely linked to their motives and/or motivation. In the article by (Vorderer et al., 2004), it is shown that motives such as escapism, mood management, achievement, and competition influence players' enjoyment. To prove this point, Yee's study confirms these findings and identifies additional components that influence players' motivation. Yee grouped all these components into three categories: achievement (advancement, mechanics, competition), social (socialising, relationships, teamwork), and immersion (discovery, role-playing, customisation, escapism) (Yee, 2006). Moreover, other research explains motivation through autonomy, competence, and relatedness (Ryan et al., 2006). To summarise, factors such as escapism, achievement, competition, and social interaction form the basis of fans' engagement.

While all these factors are important and play a huge role in the understanding of the concept of fans' engagement, they are generalised and do not specifically cover gacha games such as "Honkai: Star Rail", a game genre that expects gamers to play a game on a long-term. However, in a recent study, a survey was conducted in which participants identified their favourite aspects of gacha games: story, characters, gameplay, and collecting. Moreover, the results revealed that participants were willing to spend money (donate) to unlock characters or weapons and to unlock skins (change a character's appearance). This shows a strong willingness to spend money on the game (Lakić et al., 2023). In addition to high engagement and willingness to spend money, (Adams, 2022) emphasises that Genshin Impact's gacha system helps develop a sense of cybernetic identity, in which fans feel connected to their in-game activities. This correlates with different components of engagement.

As previously stated by (Adams, 2022), fans are engaged to spend money on their favourite characters, indicating that characters could be the centre of their engagement. This article will look at how players are engaged in the game and interested in the character through YouTube comments.

Online Textual Review

Online text reviews are user-generated content such as comments, reviews, and feedbacks shared online on different platforms or social media. These reviews reflect people's attitude and emotional responses. For instance, a study by (Chevalier and Mayzlin, 2006) shows that reviews influence people's perception on products. To imply this concept in the gaming industry, it could be said that comments have a crucial role in gamers' perception on games, game updates, and characters. Platforms like YouTube (Kavitha et al.,

2020) (Raharjo et al., 2024) and Reddit (Abiona et al., 2022) are used by users for sharing their opinions, as it has been demonstrated in several studies.

Research Method

Data collection

The YouTube Data API was used to gather comments from the official Sparkle trailer, “Monodrama” (Honkai Star, 2025). This method allows for the easy and free collection of publicly available data, such as user-generated comments, by sending requests to the API using video IDs. As a result, approximately 5,771 comments were collected between 28 February 2024 and 4 April 2025. The wide time range provides a more comprehensive understanding of fans’ reactions to the character’s trailer for further analysis.

Data analysis

The research process is illustrated in Figure 1, which presents the main stages of data collection, preparation, and analysis. After collecting users’ comments from the YouTube video, all data were compiled into an Excel file containing user information, publication date, likes, and comment text. Columns other than the comment text were then removed, and the file was analysed using the free web-based text analysis platform Voyant. Meaningless words, spam, duplicates, and non-English entries were automatically excluded using Voyant’s built-in filtration system. Further analysis was conducted using frequency word tables, word clouds, word links, and collocation tools.



FIGURE 1: Visual representation of the research flow

Source: Author

Results And Discussion

Frequency table

To explore patterns of player engagement and character popularity among “Honkai: Star Rail” fans, a frequency table of the top 30 words was generated (Table 1). This table provides insights into the terms most commonly used by fans and helps identify key aspects that sustain interest and engagement in Sparkle.

| No. | Term | Count | No. | Terms | Count |
|-----|-----------|-------|-----|-----------|-------|
| 1 | kurumi | 701 | 16 | pull | 141 |
| 2 | sparkle | 616 | 17 | crazy | 138 |
| 3 | trailer | 502 | 18 | need | 134 |
| 4 | like | 356 | 19 | insane | 126 |
| 5 | persona | 351 | 20 | magica | 122 |
| 6 | love | 328 | 21 | reference | 117 |
| 7 | vibes | 234 | 22 | acheron | 117 |
| 8 | fix | 213 | 23 | hard | 111 |
| 9 | madoka | 181 | 24 | star | 109 |
| 10 | tokisaki | 178 | 25 | rail | 107 |
| 11 | character | 174 | 26 | honkai | 99 |
| 12 | i'm | 167 | 27 | elation | 99 |
| 13 | date | 167 | 28 | want | 96 |
| 14 | good | 158 | 29 | hsr | 95 |
| 15 | live | 155 | 30 | got | 94 |

TABLE 1: Word frequency from Sparkle's trailer comment section

Source: Author

First, the two most frequent words are “kurumi” and “sparkle,” suggesting a strong focus on these characters. However, “kurumi” is not a character in “Honkai: Star Rail”, indicating a cross-media association that influenced people to mention a name unrelated to the video. Contextual analysis revealed that the character “Kurumi” has a design similar to “Sparkle,” suggesting that gamers may have been attracted to the design of the character featured in the trailer due to its resemblance to another familiar character. Also, even though the word “sparkle” is not at the top of the chart, it still indicates a high interest in the character. As a result, high mention frequency indicates high character engagement and popularity.

Second, it is noticed that gamers used words such as “like”, “vibes”, “crazy”, and “insane” in the comment section. This shows that players’ comments are not emotionally neutral; rather, they are emotionally engaged. Moreover, the word “elation” also adds positive emotional expression. These words indicate how emotional language usually accompanies fan reaction toward games’ content.

Third, the word “trailer” is also commonly used in the comment section. High frequency of this word means that players are possibly discussing animation, voice lines, and visuals that were shown in the trailer and making fans’ theory based on it. It shows a high level of interest in the trailer itself.

Moreover, words such as “madoka”, “tokisaki”, “magica”, and “acheron” provide information about certain characters that strongly resonate with the game’s community. This trend could guide developers’ insights about what kind of characters’ design community mostly like.

Also, gameplay-related terms such as “pull”, “need”, and “fix” are seen in the table. These terms show that players are invested in the gameplay and mechanics and are offering suggestions to improve their in-game experience. Also, the word “pull” directly refers to the gacha mechanic of getting a character from a banner, suggesting a possible willingness to donate into the game just to get a desired character.

Word cloud analysis

While the frequency table provides structured and numerical information, word cloud (Figure 2) is a visual representation of the same data. This type of data visualisation helps to see more quickly which words are most common in the comment section.




FIGURE 2: Word Cloud of high-frequency terms from Sparkle's trailer comment section

Source: Author

Analysis of the data also reveals the presence of linguistic informality, with words such as “i’m,” “crazy,” “god,” and “omg.” The use of informal language is typical of fan communication on social media, in our case, in the comments section on YouTube.

Co-occurrence network analysis

To further examine players’ engagement and character popularity, a word links diagram (Figure 3) was created. This type of visualisation highlights patterns of word co-occurrence, showing which terms appear together most frequently. This approach provides insights into how different words relate to each other.



FIGURE 3: Co-occurrence network analysis

Source: Author

As shown in the diagram, the terms “kurumi”, “trailer”, and “sparkle” form the triad of the diagram, with the largest font sizes and the thickest connecting lines. These terms are frequently used and often co-occur with other key terms, suggesting that these terms act as central points of discussion in the comment section. Emotional and contextual associations, such as “good”, “love”, and “persona”, are also evident. Moreover, words like “date” and “live” refer to the release date of Sparkle, the livestream events that the company holds before each release. This indicates that players are engaged not only with the character itself but also with related events.

Collocation

To complement the analysis, a collocation table was created (Table 2). This table provides deeper insights into frequently used words by revealing the associations between them.

| No. | Term | Collocate | No. | Term | Collocate |
|-----|----------|-----------|-----|---------|-----------|
| 1 | kurumi | date | 16 | sparkle | persona |
| 2 | kurumi | live | 17 | trailer | kurumi |
| 3 | madoka | magica | 18 | madoka | vibes |
| 4 | kurumi | tokisaki | 19 | kurumi | trailer |
| 5 | sparkle | sparkle | 20 | sparkle | love |
| 6 | like | kurumi | 21 | trailer | sparkle |
| 7 | kurumi | kurumi | 22 | vibes | madoka |
| 8 | kurumi | vibes | 23 | vibes | kurumi |
| 9 | kurumi | sparkle | 24 | fix | heri |
| 10 | tokisaki | kurumi | 25 | kurumi | love |
| 11 | sparkle | kurumi | 26 | persona | reference |
| 12 | love | sparkle | 27 | love | kurumi |
| 13 | fix | fix | 28 | trailer | trailer |
| 14 | persona | sparkle | 29 | kurumi | like |
| 15 | sparkle | trailer | 30 | like | sparkle |

TABLE 2: Collocation

Source: Author

The word “Kurumi” dominates as a term and collocates more than any other word, suggesting Sparkle is highly associated with it as we can see in the pairs “like + kurumi”, “kurumi + vibes”, and “kurumi + sparkle”. The pair “madoka + magica” refers to specific characters not related to the game; however, it is possible that fans have an association between Madoka and Sparkle. It is also seen in other pairs “madoka + vibes” and “vibes + madoka”. As a result, we can assume that people are engaged in Sparkle’s trailer and her as a character because of associations with other characters.

Discussion

The results of the study show that the word “kurumi” is the most occurring word in the comment section under the Sparkle’s trailer. This shows that fans of the game are not only interested in one game but are also engaged in other media forms such as anime. The highest occurrence of the word “kurumi” may also indicate that players do not see Sparkle as an independent character, constantly associating her with other characters (Kurumi and Madoka). Moreover, the dominance of “kurumi” in the comment section demonstrates the “point of engagement” stage (Aldous et al., 2023), where visual aesthetics and associations with other characters serve as the trigger for user attention before they even play the game. This is an aspect that the developers should pay special attention to while working on character design and story in the future. However, despite this tendency, players actively showed positive emotions in the comments section, which makes it clear that they are interested and involved in the new character. Also, the frequent use of affective terms suggests a high level of immersion (Yee, 2006) (Vorderer et al., 2004), where players emotionally synchronise with the character presented in the trailer. Character involvement can directly affect donations, as players are more likely to donate in order to get a new character (Lakić et al., 2023). Also, the desire to get a new character and the possibility to donate to the game are shown in the word “pull”, which is also one of the frequently used words in the comment section. Furthermore, a frequently used term that directly relates to gameplay was revealed. This indicates that players are also actively interested in the mechanics of the game, making the comments section as a place where developers can get feedback from players. Finally, feedback from players in the comments section becomes a good indicator to understand player engagement, as well as a resource for optimising the game experience and monetisation.

Theoretical implication

While existing literature (Shi et al., 2024) focuses on general experience, this paper supports and extends

(Aldous et al., 2023) concept of user engagement and complements it in the context of gacha games by showing that character design and associative references are a separate factor in the point of engagement stage. It also supports the idea of engagement through visual and emotional response manifested in comments, which complements models of emotional engagement in the games industry. This study also supports (Chevalier and Mayzlin, 2006) idea of the influence of user reviews by applying this to gacha games, showing that YouTube comments can be used as a tool to analyse player loyalty and potential monetisation.

Practical implication

This study provides practical insights for developers and marketing teams. Based on how fans actively made associations between characters, developers can take into account the uniqueness of the images in visual and storytelling to avoid further associations and strengthen the relatability of their unique characters. The results also show that YouTube comments can be used as a quick way to identify emotional reactions and evaluations of trailers, mechanics, and characters. This will help in adjusting future gaming and marketing decisions. Moreover, analysing the keywords that players used most often in their comments allows to predict not only engagement but also potentially commercial success of characters and adjust in-game events and banners on time.

Conclusions

This study focused on the big data analysis of player engagement and character popularity using a YouTube dataset related to the game "Honkai: Star Rail", specifically character's trailer. A total of 5,771 comments were analysed from February 28, 2024, to April 4, 2025. The analysis revealed that players were especially engaged with the perceived resemblance between the character Sparkle and other known characters. This finding suggests that game developers should place greater emphasis on character design to ensure uniqueness and identity clarity in future releases. Additionally, the results demonstrated strong positive emotional engagement as well as interest in gameplay mechanics and overall game experience. During the research process, several limitations were identified, including the relatively small dataset, the lack of demographic information, and a limited number of academic sources directly related to "Honkai: Star Rail".

Limitations and further research

This study offers an exploration into player engagement and character popularity using YouTube data. Despite the widespread theme of "gamer engagement" certain limitations were found. First of all, there is a significant lack of research studies on "Honkai: Star Rail". More work related to this game, in particular on player engagement, would help to expand the topic and reveal more insights regarding player engagement and character popularity. Second, the analysis relied only on YouTube English comments, which may not fully represent the player community. For future research, it is possible to expand analysis to other social platforms. Third, there is no demographical data such as age, geography, and previous gaming experience. It could help to deeply analyse the relationships between various factors to gamer engagement. Moreover, future research could include advanced techniques such as sentiment analysis and topic modelling to further quantify emotional engagement and monetisation potential.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Anastasiia Suratova, Jue Wang, Rianmahardhika Sahid Budiharseno

Acquisition, analysis, or interpretation of data: Anastasiia Suratova, Jue Wang, Rianmahardhika Sahid Budiharseno

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Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue.

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the

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