

Chat box vs. Danmaku: Exploring How Different Audience Chat UI Layouts in Video Game Live Streaming Shapes Viewers' Attention and Engagement

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Abstract

A clear and well-documented \LaTeX document is presented as an article formatted for publication by ACM in a conference proceedings or journal publication. Based on the "acmart" document class, this article presents and explains many of the common variations, as well as many of the formatting elements an author may use in the preparation of the documentation of their work.

CCS Concepts

• **Do Not Use This Code** → **Generate the Correct Terms for Your Paper**; *Generate the Correct Terms for Your Paper*; Generate the Correct Terms for Your Paper; Generate the Correct Terms for Your Paper.

Keywords

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1 Introduction

Video game live streaming has evolved into a significant cultural and social phenomenon, attracting millions of viewers who engage with streamers on platforms like Twitch, YouTube Gaming, and Bilibili. A key component of this interaction is the live chat, which allows viewers to communicate with both the streamer and fellow audiences through text messages. Two popular user interface (UI) layouts have emerged in this space: the chat box and the Danmaku (or bullet chat) system. The chat box approach separates streaming content and live chat into distinct areas, with new messages appearing and moving vertically in a dedicated chat window. In contrast,

Danmaku overlays chat directly onto the streaming content, with messages scrolling horizontally across the screen.

While the impact of chat box design has been extensively studied, the effects of Danmaku on viewer attention, engagement, and overall experience remain underexplored in Western contexts. This study aims to address this gap by investigating two key research questions:

RQ1: How does Danmaku affect viewers' eye movement patterns and attention distribution between main content and chat compared to the traditional chat box approach?

RQ2: Can Danmaku enhance overall viewing experience in live streaming compared to traditional chat boxes?

To answer these questions, we propose an eye-tracking study to measure and quantify how viewers allocate their visual attention during live streaming with different chat UI layouts. Eye-tracking technology provides objective analytical data on viewers' gaze focus and duration, enabling a detailed comparison of attentional shifts between main content and chat across different interfaces. Through analysis of these attention patterns, we aim to reveal how UI design influences the overall viewing experience and explore the potential factors contributing to the popularity of specific chat layouts in different regions.

2 Related Work

2.1 Live Streaming

Previous work has shown that streamer-audience interaction, primarily through text messaging in chat box, plays a key role in creating an engaging online live stream viewing experience. Hamilton et al. (2014) [2] explain how Twitch streams can function as "third places" for viewers to interact with the streamer and other viewers, building a sense of community. Streamers that make an effort to interact with their viewers are often highly appreciated by viewers helping the viewer to "belong". Similarly, viewers that are acknowledged and "seen" by the streamer in the live stream report enhanced viewing experiences, along with a better sense of social presence and therefore, makes them feel like they belong [3, 4, 7]. Streams that contain more interaction with the viewer and streamer are often watched more and for longer times.

2.2 Eye Tracking and Live Streaming

Contemporary eye-tracking research also highlight the crucial role of streamer-audience interaction in live streaming. For example, Mancini et al. (2022) [5] analyze viewers' eye movements in e-sports live streaming, revealing that chat box attracts the highest level of visual attention besides the actual game itself, surpassing other

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secondary visual elements such as in-game advertising and the streamer's webcam. However, as chat interaction draws significant attention from viewers, its physical separation from the main content can create challenges for viewers. Research on e-commerce live streaming conducted experiments with a fixed-position chat box, shows how separated chat box can divert attention from the main content. The findings emphasized the need to incorporate more effective chat display methods to balance between interactivity and viewing in live streaming [1]. This insight suggests an opportunity to explore Danmaku's potential in conventional live streaming scenarios as a solution to the attention division dilemma.

Furthermore, altering the chat layout offers an opportunity to examine changes in the overall viewing experience. Research on atmospheric cues in e-commerce live streaming reveals how visual diversity and richness in the live streaming setting can enhance viewer engagement and buying intentions [6]. As Danmaku can overlay scrolling text onto the streamed image, it inspires the question regarding if Danmaku can also be a source of visual diversity and richness, eventually enhancing the overall viewing experience.

Overall, the existing research underscores chat's importance in live streaming for engagement, while highlighting attention management challenges. It also reveals the potential benefits of visual diversity in live streaming. These findings point to an opportunity to explore Danmaku as a solution for integrating chat more seamlessly with content and a source of new experience in live streaming.

3 Methodology

In this study, we will conduct a within subject eye-tracking experiment on the two types of chat display methods, chat box and Danmaku. For each chat format, one area of interest (AOI) will be the main gameplay screen and the other AOI will be the chat, either a chat box or a Danmaku area. Each participant will be randomly presented one format first and their attention and fixation times and areas will be recorded and analyzed (RQ1). The same will be performed for the other chat format. Participants will then be asked to answer a post-experiment survey about their willingness to keep watching and the level of distraction (RQ2).

References

- [1] Mengqi Fei, Huizhong Tan, Xixian Peng, Qiuzhen Wang, and Lei Wang. 2021. Promoting or attenuating? An eye-tracking study on the role of social cues in e-commerce livestreaming. *Decision Support Systems* 142 (2021), 113466.
- [2] William A Hamilton, Oliver Garretson, and Andruid Kerne. 2014. Streaming on twitch: fostering participatory communities of play within live mixed media. In *Proceedings of the SIGCHI conference on human factors in computing systems*. 1315–1324.
- [3] Yi-Chieh Lee, Chi-Hsien Yen, Dennis Wang, and Wai-Tat Fu. 2019. Understanding how digital gifting influences social interaction on live streams. In *Proceedings of the 21st International Conference on Human-Computer Interaction with Mobile Devices and Services*. 1–10.
- [4] Zhicong Lu, Haijun Xia, Seongkook Heo, and Daniel Wigdor. 2018. You watch, you give, and you engage: a study of live streaming practices in China. In *Proceedings of the 2018 CHI conference on human factors in computing systems*. 1–13.
- [5] Marco Mancini, Patrizia Cherubino, Giulia Cartocci, Ana Martinez, Gianluca Di Flumeri, Luca Petruzzellis, Michele Cimini, Pietro Aricò, Arianna Trettel, and Fabio Babiloni. 2022. Esports and visual attention: evaluating in-game advertising through eye-tracking during the game viewing experience. *Brain Sciences* 12, 10 (2022), 1345.
- [6] Xinjia Tong, Yuangao Chen, Shasha Zhou, Shuiqing Yang, and Hui Jiang. 2023. Do atmospheric cues matter in live streaming e-commerce? An eye-tracking investigation. *Electronic Commerce Research and Applications* 62 (2023), 101334.
- [7] Zhenhui Zhu, Zhi Yang, and Yafei Dai. 2017. Understanding the gift-sending interaction on live-streaming video websites. In *Social Computing and Social Media. Human Behavior: 9th International Conference, SCSM 2017, Held as Part of HCI International 2017, Vancouver, BC, Canada, July 9-14, 2017, Proceedings, Part I* 9. Springer, 274–285.

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