

Who is with You? Integrating a Play Experience into Online Video Watching via Danmaku Technology

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Abstract. Online video watching coupled with audience interaction through comments overlaid on the video screen is becoming increasingly popular in China. By incorporating features of social media into the design, the underlying Danmaku technology enables users to post comments while viewing videos. The comments are then projected as scrolling titles onto the video screen, invoking a lively and playful viewing experience. Little is yet known about the unique nature of the technology and its attraction, despite growing scholarly and practical interest in Danmaku technology. In this paper, we investigate user experiences to understand the nature and impact of Danmaku technology. We report on a focus group discussion with experienced users of Danmaku video sites. Our findings suggest that the Danmaku functions (interface design, control, augmented display, anonymity) and Danmaku comments (density, relevance, timeliness, subdivision) play essential roles in creating a play experience (company, fun, emotional release, sense of belonging, attentiveness). Design principles and possible applications of Danmaku technology are discussed.

Keywords: Danmaku video · Danmaku function · Danmaku content · Play experience · Distractive experience

1 Introduction

Watching videos online is becoming increasingly popular in China. According to a recent report from China Internet Network Information Center (CNNIC), online video viewership reached 513 million in June 2016. On the internet, video sites, such as YouTube, exemplify a social environment in which rich levels of computer-mediated interaction between audiences are facilitated [8]. Viewers can share opinions related to videos through comments and rating systems. Instead of watching videos passively and alone, audiences continuously demonstrate their desire for interaction with others and a technologically advanced viewing experience [2, 14]. For instance, some viewers watch videos online while simultaneously chatting with others using a text chat feature [18], thus creating a more compelling social experience [14]. Doughty et al. [5, 6] note

that social media services (e.g., Twitter) are also changing the way people consume online videos, with audiences watching videos while using social media to broadcast their thoughts and emotions.

The introduction of Danmaku technology on video sites has provided new opportunities for richer viewing experiences [9]. Incorporating social media features, Danmaku technology enables audiences to post comments while watching videos. The comments are overlaid as synchronous, written text on the videos, visible to the author and other viewers [15]. Danmaku technology broadcasts a user’s expressed thoughts, sentiments, opinions, and emotions related to what he or she is watching as short on-screen comments. The comments are delivered as a “stream of consciousness” and appear overlaid on the video, synchronized to the video timeline but unevenly distributed. At key moments, numerous scrolling comments are projected on the video screen. The comments somewhat resemble the visual impact of a barrage of bullets in early 2D shooter games, which led to the name Danmaku (Japanese for “bullet curtain”). Figure 1 presents a screenshot of a video with Danmaku comments enabled on Bilibili.com.



Fig. 1. A screenshot of a video on Bilibili.com (source: <http://www.bilibili.com/video/av715040/>)

The first Danmaku video site, NicoNico Douga, originated in Japan in December 2006. Since then, Danmaku technology has been enthusiastically adopted in China. The most popular Chinese Danmaku site is Bilibili.com. The site was originally marketed to a subcultural user base through a focus on anime, comics, and games. Later, site managers tried reach a larger, more mainstream audience by expanding the brand to include diverse videos, such as movies, dramas, and variety shows. Danmaku use appears to have greatly affected Bilibili, which has maintained a top 10 ranking among Chinese video sites despite being launched only recently (2009) and having no major financial backing. Alexa.com ranked Bilibili at 231 among the world’s most

successful sites (January 23, 2017). Other mainstream video sites in Mainland China, including LETV, IQIYI, and Tudou, have since been providing Danmaku functionality as well. Table 1 summarizes the key differences between Danmaku and traditional video sites.

Table 1. Danmaku video sites vs. conventional video sites

	Danmaku video sites	Conventional video sites
Location of comments	Displayed as flying subtitles overlaid on the video screen, moving from right to left	Displayed in the comment area, separate from the video screen
Timeline of comments	Broadcasted to audiences in real-time, synchronized to the video timeline	Broadcasted to audiences as a thread ordered according to the historical time when the comments were made
Examples	Bilibili.com	YouTube.com

As a result, many people are changing how they consume videos. However, research interest has been lagging behind popular interest. For instance, prior research investigated either the correlation between comments and video popularity [19] or how Chinese tags for foreign movies are accepted among viewers [13]. Thus, motivations and outcomes of watching videos with overlaid comments remain under-investigated. Contradicting popular interest, scholars in human computer interaction (HCI) have contended that reading text would distract the user from watching the video, thus disrupting the viewing experience [18]. In fact, empirical evidence shows that audiences are enthusiastic about watching videos with Danmaku [3]. Thus, we conducted an exploratory study of the nature of Danmaku video watching, with the aim of identifying why audiences favor Danmaku video sites.

2 The Play Theory of Mass Communication

We draw on the play theory of mass communication to understand users' motivations and the consequences of watching Danmaku videos. The theory is based on a primary assumption: media users are extremely active and engaged in the media consumption process [11]. The play theory of mass communication contends that the masses use media to fulfill their own desires for play instead of as a serious source of information or education [16]. The author [16] introduced his belief in audience participation as follows: "I don't think of media consumption as merely entertainment in a non-ego-involving sense, but at its best as a highly developed form of subjective play." This absorption and the decreasing self-consciousness that it inspires are vital to achieving the individual development that characterizes communications play.

Modern mass media, coupled with the globalization of information dissemination exchange, has created an information-driven and knowledge-based society; it has also led to the play theory of mass communication being criticized for its narrow focus. After all, people use mass and interactive media not just for play, but also for education and information [1]. The maturing of the Internet era, bringing about a new interactivity

within media, is again profoundly changing the theoretical and practical context of communication theory. For instance, it appears that the Danmaku phenomenon is, as the author described, emphasizing communication and providing subjective play experiences for audiences via instant and highly synchronized information [20, 21]. Therefore, rediscovering the play theory of communication may provide theoretical support for identifying characteristics of the play experience in watching Danmaku videos.

3 Methodology

We employed the focus group discussion method for this exploratory study to carry out in-depth group interviews. In focus group research, participants are selected because they are a purposive, although not necessarily representative, sampling of a specific population. The group is “focused” on a given topic [17], leading to the development of a theoretical understanding of cognitive, behavioral, situational, and environmental factors [10]. Following Gwinner et al. [7], we recruited thirteen postgraduate students as participants. Three or four focus groups are usually recommended unless the research needs to address many research questions [11]. The thirteen participants were thus assigned to three groups (five in group 1, five in group 2, and three in group 3). All participants had self-reported experiences in watching Danmaku videos, of varied length and intensity.

All groups met the focus group moderator in the same room. Before the discussion, all participants were asked to provide demographic information (see Table 2).

Table 2. Participant demographics

Group	Participant ID	Gender	Age	Frequency of usage	Average duration of usage	Favorite video type
Group 1	1-A	F	23	Everyday	1 h	Animation, music videos
	1-B	F	22	4–6 times per week	1–2 h	Drama
	1-C	F	24	Once a week	2 h	Movie, drama
	1-D	F	21	Once per 3 months	3–5 h	Drama
	1-E	F	22	Twice per month	6 h	Variety show, animation
Group 2	2-A	M	24	Once a week	2–3 h	Drama
	2-B	F	22	2–3 times per week	3–4 h	Animation, drama, music videos
	2-C	F	22	Once a week	2–3 h	Drama
	2-D	F	21	Once a month	1–2 h	Documentary, drama, variety show
	2-E	F	21	Once per 2 months	3 h	Variety show, drama
Group 3	3-A	M	21	Once a month	1–2 h	Documentary
	3-B	F	22	1–2 times per month	1–2 h	Variety show
	3-C	F	23	Everyday	2–4 h	Animation, game videos

Participants were then seated in a circle to discuss their experiences. All groups met with the same moderator. Each focus group discussion lasted for 1 h. The moderator recorded the discussion, which was held in Chinese. Afterwards, two bilingual PhD students separately translated the discussion into English. The PhD students then compared translations and provided a final English version of the discussion.

4 Results

4.1 Danmaku Function

We extracted four components of Danmaku functionality: interface design, control, augmented display, and anonymity.

Interface Design. Interface design refers to the design of video sites. Participant 1-A said, “The ease of use of the interface is the key factor that determines whether I continuously use a particular video site or not.” Participant 2-B added, “I like to use Bilibili because the videos are clearly classified into different categories. Thus, it is very easy to find videos I am interested in according to the classification.” Participant 3-B observed, “The most popular videos on [Bilibili.com](https://www.bilibili.com) are updated on the homepage frequently and in a timely manner. Users are always aware of what is popular.”

Control. Control is the degree to which a person believes that using a particular system is effortless [4]. Participants emphasized the importance of control in generating a play experience. For example, Participant 1-C said, “I am able to customize my comments, such as text color, text size, and text location.” Participant 2-D said, “I am able to filter the Danmaku comments. For example, I can set up some keywords in the Danmaku system, and then insults, quarrels, and different perspectives containing these keywords are blocked and not shown when I watch the video. By doing this, I may selectively read the comments I like.” Participant 3-A remarked, “There is a peer-moderation system on Danmaku video sites. If there are any inappropriate comments, I am able to report them to administrators. The administrators delete inappropriate comments very quickly, which makes the Danmaku atmosphere friendlier.”

Augmented Display. Part of the appeal of Danmaku video sites is that, compared with comments posted in an area separate from the videos, audiences are able to add comments while watching videos and the comments are shown as moving subtitles overlaid on the video screen. Furthermore, during playback, the comments appear at the particular point in the video timeline when they were posted originally. The resulting augmented display is composed of two sub-dimensions: (1) comments are augmented with the video screen, and (2) comments are augmented through the video timeline. Participant 1-E said, “The comments are projected directly on the video as part of a scrolling information feed that moves from right to left.” Participant 2-A added, “The comments are projected into the comment feed based on the point in time during viewing that they were input by the user.”

Anonymity. All of the Danmaku comments are shown without attribution, so the mode of communication is completely anonymous. Anonymity encourages viewers to

add comments. Participant 1-D highlighted this: “Anonymity makes me more willing to post comments and express my real feelings”. Participant 2-A added, “In an anonymous context, I don’t feel the pressure that I have to post something right or something that others like.”

4.2 Danmaku Content

We extracted four aspects of Danmaku comments: density, relevance, timeliness, and specificity.

Comment Density. Comment density refers to information introduced per time unit [12]. Low comment density indicates that little communication is triggered by the video, while high comment density indicates the opposite. Participant 3-C expressed, “I don’t like to watch videos with low density because it feels like that there are not many other viewers, which is boring. I also don’t like to watch videos with high density because there are too many comments that cover the videos, preventing me from watching videos.” Participant 1-B added, “Moderate comment density is preferred. In that case, I can watch the video and the comments at the same time, which for me is great fun.”

Comment Relevance. Comment relevance refers to whether the comment is relevant to the video content. Participant 2-E said, “I like comments that are relevant to the video content. For example, when there is a sad atmosphere, comments such as ‘so sad’ and ‘cry me a river’ resonate with me.” Participant 1-C said, “When I was watching *House M.D.*, I did not understand the meaning of a medical term. Then viewers left comments that explained the term precisely, which made me feel very good.” Participant 3-C said, “I hate jokes when a sad scene is playing, which ruin the aesthetics.”

Comment Timeliness. Comment timeliness refers to comments related to a specific scenario are shown at the appropriate playback time. Participant 2-B said, “For example, if I was watching a 10-minute video, the comments about the content at the fifth minute should be posted and displayed at that time. If you posted a comment at the 6th minute, the video may be presenting a totally different subject, so your comment would turn out to be irrelevant.”

Comment Specificity. Comment specificity refers to whether the comments are allocated to and specified for a specific playback time. Participant 1-B observed, “Most of the comments on conventional video sites are general feedback about the entire video; there are rarely comments on a particular scene. Actually, when I was watching a video, I had strong feelings about particular emotional scenes rather than the whole video. Thus, I prefer to read the comments targeted to specific scenes.”

4.3 Play Experiences

We identified five elements contributing to play experience: company, fun, emotional release, sense of belonging, and attentiveness.

Company. All of the participants reported a feeling of being with company while watching videos with Danmaku comments. Participant 1-C said, “Comments overlaid on videos make me feel that there are people somewhere who are watching the videos together with me.” Participant 2-E added, “The anonymous comments help to break the restriction of time and location, which makes me feel that at this moment, someone else is watching the same video with me, and is trying to communicate with me by adding Danmaku comments.” Participant 2-C stated, “On conventional online video sites, prior audiences’ comments are listed as a thread. It is easy to tell when they posted the comments and who the commenters are. If I find that the latest comments on a video were posted a long time ago, for example, two years ago, this makes me feel that the video is out-of-date and that nobody is watching it anymore. I will not leave a comment on the video as I feel that it is a waste of time since nobody will watch this video and read my comments. However, on the Danmaku video sites, users are unaware of the time the comments were posted. Once I play a video, every comment is perceived as having been posted at the time I am watching it. Thus, I leave comments, and I believe that my comments will be read and replied to by the next viewers.”

Fun. Viewers watch Danmaku videos for fun. Participant 1-A, 1-E, 2-B, 2-C, 3-B and 3-C all agreed. 3-C voiced, “I feel very entertained when I watch videos with overlaid comments, because I can always find novel, amusing, and inspiring comments.”

Emotional Release. Audiences watch Danmaku videos to express their feelings with others. Participant 2-C, for instance, remarked, “When I have some feeling in my mind while watching a video, I am eager to express it. The Danmaku system helps me accomplish this.” Participant 1-D added, “When I have strong feelings about a scene, I can immediately express it at the specific playback time, which makes me feel an emotional release.”

Sense of Belonging. Users watch Danmaku videos because they favor collective forms of membership and participation, and because they enjoy belonging to a group that shares the same interest [3]. Participant 3-B affirmed, “Compared with the element of strong relationships, which involves attachment or intimacy, I am satisfied with superficial relationships, such as the sense of belonging elicited by finding a group of people who have similar perspectives. I am not seeking to build one-to-one relationships with other viewers in the way that I do on social network sites.” Participant 3-C stated, “There is no need to know who posted the Danmaku comments. What I really care about is whether other viewers share similar opinions or emotions about the videos.” Participant 1-E noted, “When I think some part of a video is hilarious, I am very happy to see that others have the same feelings as I do. I am not the only one who finds it funny.”

Attentiveness. Watching Danmaku videos helps maintain user focus on this behavior. Participant 1-D mentioned, “There are some videos that I find less enjoyable, and thus, I cannot watch them for more than 10 min. However, when the videos are combined with Danmaku comments, I can watch full videos that last for one hour. Interesting Danmaku comments make my viewing experience more enjoyable and help maintain my attention.”

4.4 Distracting Experiences

We summarized distracting experiences as perceived intrusiveness and cognition overload. Concerning perceived intrusiveness, Participant 2-A explained, “The type of videos I am going to watch determines whether I will watch Danmaku comments or not. For example, I like Danmaku comments when I am watching entertaining contents, such as variety shows, music videos, or dramas. However, when I am going to watch movies or serious dramas, Danmaku comments are distracting” As for cognition overload, Participant 3-C mentioned, “I can’t watch videos and Danmaku comments together for a long time, since processing the information from both sides makes me feel stressed. I turn off the Danmaku function if I feel tired.”

We summarized the nomination frequency of above mentioned sub-dimensions in Table 3. In particular, each sub-dimension has been nominated by more than half of the group discussion participants. For example, ten out of thirteen participants nominated interface design, which provides additional justification for the sub-dimensions we have identified.

Table 3. Number of sub-dimension nominations

Construct	Sub-dimensions	Number of nominations
Danmaku function	Interface design	10/13
	Control	11/13
	Augmented display	13/13
	Anonymity	9/13
Danmaku content	Comment density	9/13
	Comment relevance	8/13
	Comment timeliness	7/13
	Comment specificity	9/13
Play experience	Company	13/13
	Fun	13/13
	Emotional release	10/13
	Sense of belonging	11/13
	Attentiveness	8/13
Distractive experience	Perceived intrusiveness	10/13
	Cognition overload	9/13

5 Discussion

People’s online video watching habits are being subjected to forces of change as technology advances. Evidence from Danmaku video sites shows that media technologies are evolving from traditional mass media (e.g., YouTube) to those that can address modern audience demands for direct and instant communication, thus offering an enhanced user experience. Understanding the nature of Danmaku video watching is the focus of our study. The results of focus group discussions show that despite the obvious shortcomings (perceived intrusiveness and cognition overload), watching

Danmaku videos appears to be intriguing and attractive [3]. We attribute the attractiveness of Danmaku video sites to the facilitation of the play experience among users. Play experience is composed of five key components: company, fun, emotional release, sense of belonging, and attentiveness. Furthermore, our findings suggest that Danmaku functions (interface design, control, augmented display, anonymity) and Danmaku comments (density, relevance, timeliness, subdivision) are essential in creating the play experience. We then propose a conceptual framework based on the group discussion findings as shown in Fig. 2.

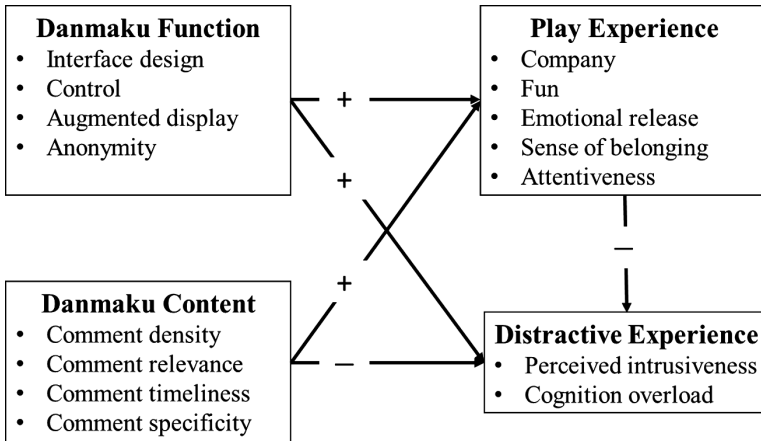


Fig. 2. Conceptual framework

The present study, though exploratory, can extend our understanding of the play theory of mass communication. By adopting the theory, we introduced the concept of play experience and found it supported by the evidence. This, in turn, implied that users consider whether they can have fun, feel that they are among company, release their emotions, and experience belonging to a group of people with similar interests. Our study also has the potential to extend the research on user participation in Danmaku video sites by examining the indicators of play experience. Thus this study adds useful knowledge about the design of Danmaku functionality and the moderation of Danmaku content to affect users' play experience, which in turn predicts users' intention to participate. In order to improve video site performance, practitioners may wish to focus on advancing Danmaku functions and regulating Danmaku comments.

Our study leaves many questions unanswered, which may trigger additional research. First, the type of video shown may determine whether audiences will display overlay comments. As participant 1-A said, "I never watch serious videos together with Danmaku comments. Most of the Danmaku comments are funny, hence not appropriate to be shown on solemn occasions. For example, during a military parade, when the presidents of different countries are gathered, it is impolite to make fun." By contrast, participant 3-C said, "I hope there are lots of Danmaku comments when I am watching

a variety show. More comments will create a better play experience. Sometimes I'll wait until there are large amounts of comments before I watch the video." Further research could explore the impact of video genre or mood, and investigate how people perceive Danmaku comments.

Second, users may watch comments to obtain a utilitarian experience (e.g., information seeking). Participant 1-A, for instance, said, "I can always get useful information from the Danmaku comments. Other viewers may provide information about the background music, the actors, historical events, which I will miss if I only watch videos." In addition, participant 2-B stated, "I care more about the comment usefulness for serious videos. I hope for a moderate amount of comments, which are useful and highly relevant to the videos." Therefore, in order to better understand users' needs for information seeking, future research must explore a range of comment quantity, comment quality, and video content. Future research may also investigate whether watching Danmaku videos can elicit both a play experience and a utilitarian experience, notably in an educational setting.

Third, it is important to consider whether users' personalities have an impact on Danmaku video watching. For example, participant 1-D said, "I am not a person who is very sensitive and open-minded to new technology. Hence, even though my friends highly recommended Danmaku video sites to me, I am not that interested." Future research may enhance the current study by investigating the effect of user personality on the play experience.

Finally, there are opportunities to expand and test our propositions, to refine Danmaku functions, Danmaku comments, and the play experience. Further research could empirically examine the relationship between Danmaku functions and play experience, as well as the relationship between Danmaku comments and play experience. Given various types of video, user personalities have the potential to influence play experience in diverse ways, so it would be beneficial to conduct research incorporating these factors. Likewise, additional research is needed to examine other experiences obtained from watching Danmaku videos, notably utilitarian experiences.

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