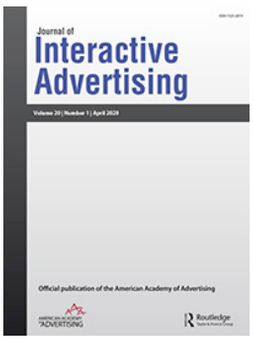

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Exploring the Effect of Incorporating Danmaku into Advertising

Lewen Wei, Tongxin Sun, and Bingjie Liu

Donald P. Bellisario College of Communications, Pennsylvania State University, University Park, Pennsylvania, USA

ABSTRACT

This study explored the effect of incorporating danmaku, a website feature which allows viewers' comments to scroll on top of videos that are streaming online, into advertising. Through a 2 (danmaku: absence versus presence) × 2 (ad type: nonhumor versus humor) × 2 (comment type: not cueing humor versus cueing humor) online experiment, we found a conditional effect of implementing the danmaku format on boosting advertising effectiveness. Specifically, when the ad content and comment content were incongruent—such that comments not cueing humor were used for humor ads, or comments cueing humor were used for nonhumor ads—danmaku ads fostered more favorable attitudes toward the ad, the brand, and the advertised product via heightened social presence. In light of the conditional effects, we discuss theoretical and practical implications of the findings and directions for future research.

KEYWORDS

Danmaku; interactivity; social presence; intrusiveness

When consumers watch videos online, do they like seeing other users' comments scrolling live on top of the videos simultaneously? Traditional video-sharing websites typically display videos and viewers' comments in separate spaces with the comment area placed outside of the video window. In recent years, a new website feature has come into use: Danmaku overlays users' comments directly on the video being played. Research suggests that danmaku induces a sense of social interaction among viewers (Shen, Chan, and Hung 2014), enhancing users' gratification from watching entertainment videos (Chen, Gao, and Rau 2017) and online learning effectiveness (Yao, Bort, and Huang 2017).

Can the potential of danmaku in enhancing viewing experience be exploited in improving online advertising effectiveness? Some suggests that it can, as danmaku enables a more interactive, engaging watching experience, and the heightened interactivity might encourage more attention paid to the advertisements (Xu and Sundar 2016). However, processing ad content and scrolling live comments simultaneously could overwhelm consumers, thus compromise advertising effectiveness.

In light of the psychological mechanisms underlying its effects, danmaku might be more or less effective given the nature of the ad content and the comments. Capitalizing on its effect of enhancing the social experience, danmaku is expected to work better for ads appealing to shared experience more than other types. For instance, humor ads have a social nature and are widely utilized across various media channels (e.g., Vanden Bergh et al. 2011; Madden and Weinberger 1982). Advertisers and marketers use humor in ads because it helps induce positive reactions and creates shared experiences among consumers (Eisend 2018; Weinberger and Gulas 1992), thereby cultivating positive relationships between consumers and brands (Kay 2018), which ultimately increases actual purchases.

To explore in what contexts danmaku is most effective in improving advertising effectiveness, the present study examines effects of danmaku on effectiveness of ads differing in their reliance on social experience (humor ads versus nonhumor ads). Specifically, effects of danmaku on advertising effectiveness through enhancing interactive experience are expected to be more relevant and prominent when

CONTACT Lewen Wei lpw5086@psu.edu Donald P. Bellisario College of Communications, Pennsylvania State University, 115 Carnegie Building, University Park, PA 16802, USA.
Lewen Wei (MA, Pennsylvania State University) is a doctoral student, Donald P. Bellisario College of Communication, Pennsylvania State University.
Tongxin Sun (MA, Pennsylvania State University) is a graduate, Donald P. Bellisario College of Communication, Pennsylvania State University.
Bingjie Liu (MA, Chinese University, Hong Kong) is a doctoral student, Donald P. Bellisario College of Communication, Pennsylvania State University.

there are humor elements in ads. In addition, by rendering other consumers copresent, or psychologically closer, danmaku is expected to magnify effects of the comments on consumers' ultimate attitudes as well. Based on existing theories and research, we propose perceived interactivity, social presence, and perceived intrusiveness as the underlying mechanisms of danmaku's effects. In the next section, we discuss the effect of the danmaku format, then follow with discussions on the effect of the types of ad (i.e., nonhumor versus humor) and the content of user comments (i.e., not cueing humor versus cueing humor) on ads effectiveness and the psychological mediators.

Literature Review

The Effect of the Danmaku Format

Research has found that danmaku enhances the viewing experience (Chen, Gao, and Rau 2017; Yao, Bort, and Huang 2017), yet little is known about the mechanisms underlying this effect in the context of digital advertising. Based on existing theories and research on interactive media effects and advertising, we have identified three mechanisms—namely, perceived interactivity, social presence, and perceived intrusiveness—that might explain the effect of danmaku on consumer responses.

First, danmaku provides source interactivity affordance such that users can act as a source of messages by "shooting" their own comments directly onto the video (Sundar et al. 2015). Being able to interact with both the video and other viewers' comments is expected to enhance a positive viewing experience and improve advertising effectiveness. According to the theory of interactive media effect (TIME; Sundar et al. 2015), interactivity affordance influences user psychology via both the *action route*, when users actually engage the affordance, and the *cue route*, when mere exposure to the cue associated with the affordance triggers related heuristics (i.e., mental shortcuts) guiding their perceptions and behaviors (see MAIN model; Sundar 2008). The current study focuses on the cue route.

Specifically, the operative heuristic when seeing scrolling comments on the screen is *activity heuristic*: "a departure from the passivity that characterizes traditional media" (Sundar 2008, p. 85). Seeing scrolling comments from others on the screen (i.e., cues)—that is, sensing the system allows users to proactively engage in similar interactions with the video content and other audiences—users can actively envision themselves projecting their comments onto the screen and thereby perceive the video as more interactive. Research suggests that perceived interactivity can "function to transform the impact of interactivity" (Bucy and Tao 2007, p. 658). In the present study, we consider perceived interactivity as the psychological mechanism underlying the effects of danmaku on advertising effectiveness.

Empirical research has found that perceived interactivity positively influences attitudes in various contexts. For instance, when reading a blog, if readers are led to feel they can communicate with the blogger by posting a message, readers report more positive attitudes toward that blog website and blogger (Thorson and Rodgers 2006). Likewise, digital magazines that enable readers to contribute by including interactive features, such as a "comment button," enhanced perceived interactivity among audiences, which led to more favorable attitudes toward the magazines (Rauwers, Voorveld, and Neijens 2016).

We hypothesize that, compared to regular video ads, danmaku is perceived as more interactive. With the activity heuristic being triggered, consumers might feel more engaged with the ads, thus the appeals employed in the ads can function more effectively. Hence, we propose the following hypotheses:

> **H1:** Compared to regular video ads, danmaku ads will engender a higher level of perceived interactivity with ads.
>
> **H2(a):** Compared to regular video ads, danmaku ads will have a more positive indirect impact on favorable attitudes toward the ads via perceived interactivity.
>
> **H2(b):** Compared to regular video ads, danmaku ads will have a more positive indirect impact on favorable attitudes toward the brand via perceived interactivity.
>
> **H2(c):** Compared to regular video ads, danmaku ads will have a more positive indirect impact on favorable attitudes toward the product via perceived interactivity.

Second, danmaku might enhance ad effectiveness by heightening the social presence of other potential consumers watching the same ad. With danmaku, consumers can not only respond to other viewers in a seemingly real-time fashion but also receive others' comments responding to their own comments. This form of conversational commenting resembling live conversations increases both the immediacy and intimacy of an interaction (Lombard and Ditton 1997; Short, Williams, and Christie 1976). Hence, it can foster social presence—the perception that many consumers are watching the ads together and having

shared their viewing experiences (Fortin and Dholakia 2005; Lombard and Snyder-Duch 2001).

Existing research suggests that enhanced social presence, or a warm sense of human contact and sociability (Hassanein and Head 2007), is conducive to positive consumer attitudes (Choi, Miracle, and Biocca 2001). For instance, Cui, Wang, and Xu (2010) found that cueing the online presence of other consumers on a website by indicating others' concurrent browsing behaviors to participants led to more favorable attitudes toward the website. Another study found that websites that have higher levels of social richness, and therefore higher social presence, are preferred by consumers (Hassanein and Head 2007). Therefore, we postulate that danmaku can facilitate social presence, thus resulting in more favorable attitudes among potential consumers.

H3: Compared to regular video ads, danmaku ads will engender a higher level of social presence.

H4(a): Compared to regular video ads, danmaku ads will have a more positive indirect impact on favorable attitudes toward the ads via enhanced social presence.

H4(b): Compared to regular video ads, danmaku ads will have a more positive indirect impact on favorable attitudes toward the brand via enhanced social presence.

H4(c): Compared to regular video ads, danmaku ads will have a more positive indirect impact on favorable attitudes toward the product via enhanced social presence.

Third, despite its previously mentioned positive effects, danmaku could be perceived as intrusive because it obscures video content and therefore inhibits its information processing and compromises the viewing experience. In some research, participants reported danmaku as entertaining but distracting (Chen, Gao, and Rau 2017; Yao, Bort, and Huang 2017). A recent study found that moving danmaku comments from overlaying the video to a separate area below the video improved user experience on an online learning platform, especially for those who initially found the overlaid danmaku comments to be an interference (Yao, Bort, and Huang 2017). Therefore, we hypothesize that, compared to regular video ads, danmaku might be perceived as more intrusive, which might then lead to negative attitudes toward the ad, the brand, and the product, as suggested in previous research (Feng and Xie 2019; Kim 2018).

H5: Compared to regular video ads, danmaku ads will engender a higher level of perceived intrusiveness.

H6(a): Compared to regular video ads, danmaku ads will have a more negative indirect impact on favorable attitudes toward the ads via perceived intrusiveness.

H6(b): Compared to regular video ads, danmaku ads will have a more negative indirect impact on favorable attitudes toward the brand via perceived intrusiveness.

H6(c): Compared to regular video ads, danmaku ads will have a more negative indirect impact on favorable attitudes toward the product via perceived intrusiveness.

Taken together, we consider these three perceptions working in a parallel manner as immediate responses to danmaku. But it is unclear what the ultimate effect of danmaku on consumers' perceptions will be in the context of advertising. On one hand, danmaku might enhance the overall viewing experience by bringing in higher perceived interactivity and social presence, which can then be transferred into favorable consumer attitudes. On the other hand, its intrusiveness might concurrently compromise the consumers' experiences. We propose the following research questions regarding the overall effectiveness of danmaku in online advertising:

RQ1(a): How will danmaku influence consumers' attitude toward the ads?

RQ1(b): How will danmaku influence consumers' attitude toward the brand?

RQ1(c): How will danmaku influence consumers' attitude toward the advertised product?

So far, we have discussed the potential effect of danmaku as a media format without considering the content factors in advertising practices. Because perceived interactivity and social presence might be more relevant and influential for certain types of ads with certain user comments, the effect of the danmaku format might be contingent on the nature of the ads and the content of the comments. In the following sections, we further discuss potential effects of (1) ad type and (2) user comments on incorporating danmaku into online advertising.

Social Function of Humor in Ads

Triggering surprise and incongruity, humor is a powerful strategy in advertising for its ability to elicit pleasant feelings (Martin 2010); these feelings may then facilitate favorable consumer attitudes toward advertising by leading potential consumers to associate

the good feelings with the ad, the brand, and the product (Mehta and Purvis 2006). Moreover, the effectiveness of humor will be further heightened if it is a shared experience with others. According to Eisend (2018), from an evolutionary perspective, humor, "as an element of language [that] maintains pleasurable associations to conversations that bond human beings and forms affectional ties amongst them" (p. 537), has the social function of vocal grooming. Therefore, we argue that when watching online ads, humor in ads can engender shared affective experience, thus connecting consumers with one another. Such bonding ultimately has the potential to increase liking for the source of the humor (i.e., ads and related; Eisend 2018), as supported by previous research in humor advertising (e.g., Weinberger and Gulas 1992).

In light of the social function of humor, we expect that danmaku is more relevant for the effectiveness of humor ads than nonhumor ads because social presence is likely to be more influential in the generation of a shared affective experience for humor ads. Specifically, danmaku is expected to enable consumers to bond with one another to a greater extent and lead to more favorable consumer responses to humor ads as compared to nonhumor ones. That said, overlaying videos with scrolling comments, although promising in fostering perceived interactivity and social presence, might otherwise backfire by hindering consumers from processing the video content and result in failures in catching the humor cues in ads, which can render the humor elements in the ads ineffective in terms of eliciting pleasant affect and social bonding.

The Effect of Comment Content

It is noncontroversial that one's attitudes and emotions are subject to those of others as found in an abundance of research on social influence, such as conformity (Cialdini and Trost 1998) and emotion contagion (Hatfield, Cacioppo, and Rapson 1994). This is especially relevant in the context of ads appealing to good feelings, such as humor ads, in that laughter caused by humor elements could be emotionally contagious in a crowd (Hatfield and Rapson 1998; Provine 1992). Specifically, when watching humor ads, reading danmaku comments that echo the ad's critical funny points might amplify the extent of humor felt by consumers (Zhang and Zinkhan 1991), increase the perception of socially bonding with others, and lead to more positive affect experiences than when watching in solitude. Previous research on danmaku found that seeing comments pointing out or describing the funny aspects of the video is one of the most important reasons that people like danmaku videos (Chen, Gao, and Rau 2017).

A related but underexplored question is the effect of the congruence between ad content and other potential consumers' comments on one's perceptions of danmaku. Research thus far on the general congruence effect has found that consumers favor congruence in processing ad messages because it increases the compatibility between the ad and the host environment (Choi and Rifon 2002; Kim, Lee, and Chung 2017). For example, thematically matching the content of in-stream ads with YouTube videos helped consumers to better recall and recognize advertising content (Kononova and Yuan 2015). In another study, Choi and Rifon (2012) found that when promoting products, increasing the congruence between a celebrity endorser's image and the consumer's idealized self-image, as well as the congruence between the celebrity and the product, could yield more favorable consumer attitude. In our context, then, when humor ads are matched with comments acknowledging or responding to the humor elements, danmaku may further intensify the congruence effect: Compared to a static comment box, the scrolling danmaku makes the compatibility between humor in the ad and humor in the comments more salient when watching the video ads as a result of higher perceived interactivity of the ads and greater social presence of other consumers. In addition, congruence may also lead consumers to experience less intrusion from the danmaku format as a result of smoother information processing allowed for by the ad–comment agreement. Ultimately, these favorable perceptions could further enhance advertising effectiveness.

Another line of research suggests the opposite: Incongruence might lead to more advertising effectiveness, and its effect will also be magnified by danmaku. When watching online ads, consumers might have their own ad schema in processing ad information, such as whether the progression of ads is consistent with their own expectations (Loef 2002). If confronted with schematic inconsistency as a result of expectancy violation (Burgoon 1993), it is likely that consumers will become more cognitively involved with processing message content and thus attend less to the ad's persuasive intent (Dahlén and Edenius 2007), which potentially turns into more favorable consumer responses (Jurca and Madlberger 2015; Mandler and Parker 1976).

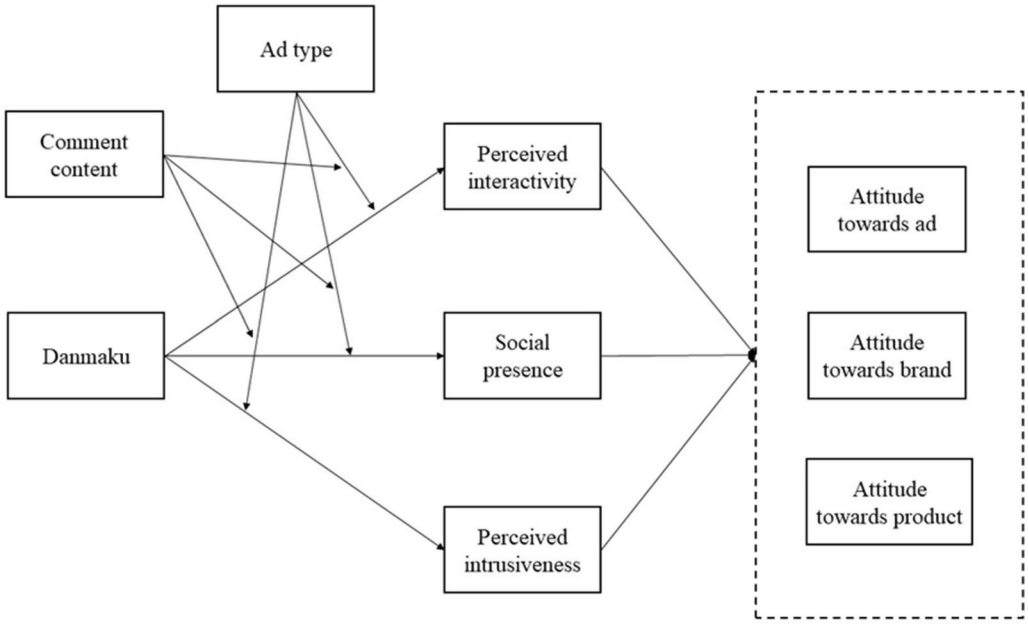

Figure 1. Proposed moderated mediation model. This model illustrates research questions 3a, 3b, and 3c that tested how ad type and comment content might moderate effects of danmaku on three parallel mediators–perceived interactivity, social presence, and perceived intrusiveness, which further influenced consumer attitudes.

In the danmaku ad context, compared to danmaku comments that explicitly resonate with humor ads, those indicating viewers are being entertained by the unfunny moments in the ad or *not* being entertained by the funny elements might result in consumers becoming more aware of the content of the video ads, thus attending to others' comments more and perceiving the experience as more interactive. Furthermore, the incongruity might also enhance the influence of danmaku on the perceived presence of other users due to the existence of disagreement, while simultaneously reducing the influence on the level of intrusion, as consumers would want to read others' comments and understand why they do or do not resonate with the ads.

In light of the contradictory possibilities in terms of the effect of the ad type and the comment content on danmaku effects and the lack of direct empirical experience in the past, we propose additional research questions to further explore how danmaku is received in advertising under different circumstances. The first set of questions asks how the presence of humor in ads and how the thematic congruence between ads and comments might impact the effect of danmaku on perceptions of advertising experience:

RQ2(a): To what extent do ad type (nonhumor versus humor) and comment content (cueing humor versus not cueing humor) influence the effect of danmaku on consumers' perceived interactivity?

RQ2(b): To what extent do ad type (nonhumor versus humor) and comment content (cueing humor versus not cueing humor) influence the effect of danmaku on consumers' social presence?

RQ2(c): To what extent do ad type (nonhumor versus humor) and comment content (cueing humor versus not cueing humor) influence the effect of danmaku on consumers' perceived intrusiveness?

As discussed in previous sections, the three parallel perceptual variables (i.e., perceived interactivity, social presence, and perceived intrusiveness) can influence one's ad-related attitudes. Given that these perceptions might be subject to the presence of danmaku, ad type, and comment content, as previously mentioned, we propose this second set of research questions testing a moderated mediation model, as presented in Figure 1.

RQ3(a): To what extent do ad type (nonhumor versus humor) and comment content (cueing humor versus not cueing humor) influence the effect of danmaku on consumer perceptions (i.e., perceived interactivity, social presence, and perceived intrusiveness), which further impact consumers' attitude toward the ad?

RQ3(b): To what extent do ad type (nonhumor versus humor) and comment content (cueing humor versus not cueing humor) influence the effect of danmaku on consumer perceptions (i.e., perceived interactivity, social presence, and perceived intrusiveness), which further impact consumers' attitude toward the brand?

RQ3(c): To what extent do ad type (nonhumor versus humor) and comment content (cueing humor versus not cueing humor) influence the effect of danmaku on consumer perceptions (i.e., perceived interactivity, social presence, and perceived intrusiveness), which further impact consumers' attitude toward the product?

Ultimately, in light of the co-occurrence of psychological mechanisms with opposite implications for advertising effectiveness (i.e., perceived interaction and social presence enhance user attitudes, whereas perceived intrusiveness compromises user attitudes), we intend to examine the moderating effect of ad type and comment content on advertising effectiveness in response to danmaku. With aforementioned psychological processing of ads varying in the existence of danmaku, ad type, and comment content, we propose the following questions to examine how consumers evaluate different types of online interactive ads:

RQ4(a): To what extent do ad type (nonhumor versus humor) and comment content (cueing humor versus not cueing humor) influence the effect of danmaku on consumers' attitude toward the ads?

RQ4(b): To what extent do ad type (nonhumor versus humor) and comment content (cueing humor versus not cueing humor) influence the effect of danmaku on consumers' attitude toward the brand?

RQ4(c): To what extent do ad type (nonhumor versus humor) and comment content (cueing humor versus not cueing humor) influence the effect of danmaku on consumers' attitude toward the product?

Method

Study Design[1]

To test our hypotheses and answer our research questions, we conducted a $2 \times 2 \times 2$ online between-subjects experiment to examine consumers' evaluations of online video ads varying in terms of the presence of danmaku, the presence of humor in ads, and the contents of comments from other users. The first factor was manipulated by varying the presence of danmaku in the video ads: In the no-danmaku condition, viewer comments were displayed only on the right side of the video ads; in the danmaku condition, the same comments were displayed both on the right side of the video ads and overlaying the video. The second factor, ad type, also had two conditions, where participants watched either a nonhumor ad or a humor ad. The third factor, comment contents, was separated into two types depending on whether or not they explicitly cued that the ad was humorous.

Participants

We recruited participants ($N = 518$) from Amazon Mechanical Turk (MTurk). We specifically asked for participants currently located in the United States who had completed at least 50 Human Intelligence Tasks (HITs) and with a HIT approval rating of at least 80%. For this estimated 10-minute study, upon successful completion, participants were compensated with $0.40 (i.e., $2.40 per hour).

There were 236 males and 276 females (one indicated "other"; three did not disclose; two responses missing), ranging from 18 to 86 years old ($M = 36.19$, $SD = 12.49$). Among all, 70.1% participants identified themselves as Caucasian, 57.8% indicated having a bachelor's degree or higher, and 62.9% had an annual household income of more than $40,000.

Stimuli

Choices of Ads

We first retrieved five humor ads and five neutral (i.e., nonhumor) ads from ads archive websites, such as www.adforum.com. We then recruited 50 participants located in the United States via MTurk and asked them to rate the perceived humor of a random set of five selected ads. On average, the humor ads ($M = 4.75$, $SD = 1.79$, SE = .35) were perceived as significantly more humorous than the nonhumor ads ($M = 3.99$, $SD = 1.74$, SE = .34), t (25) = 14.73, $p < .001$, one-tailed.

To control for random effects due to the brand and the product, we selected two ads for each condition (nonhumor versus humor). Based on the results of the pretest, the two most humorous and two least humorous ads were selected for each condition. For nonhumor ads, the "The Best Mixed Drinks Start Pure" ad, produced by Smirnoff in collaboration with Pharrell Williams ($M = 3.78$, SE = .40), and the "The Lost Art of Getting Together" ad, produced by Chinet ($M = 3.89$, SE = .35), were rated as the least humorous. For humor ads, the "Walk-in Fridge" ad, produced by Heineken ($M = 5.29$, SE = .32), and the "DOOM Hole in the Wall" ad, produced by GameStop ($M = 5.15$, SE = .33), were rated as the two most humorous. These videos are equivalent in other aspects, such as length (about 30 seconds).

Danmaku

We created websites that presented video ads and comments using templates on Wix.com. We used Adobe Premiere to create danmaku comments within the video ads. Danmaku comments were made to

scroll from right to left on top of the video at a moderate speed to allow participants enough time to read them (a sample danmaku stimulus can be found in the Appendix A). Given the speed of scrolling and the total length of each video ad, 13 comments were presented for each ad to give participants enough time to watch the ad and simultaneously read the comments. In the no-danmaku condition, comments were displayed adjacent to the video in the form of a regular comment box.

All of the comments were extracted from real user comments on YouTube. For comments cueing perceived humor, we specifically included phrases such as "hahahaha" and "Feels like a funny one" to demonstrate the high level of humor felt by other viewers. Otherwise, these sentences were replaced with comments that did not suggest felt humor toward the video ad such as "looks nice" and "Feels like a clever one."[2]

Procedure

After participants consented to participate in this study, they first answered a set of questions related to their involvement with the brand and its product randomly selected from our four stimuli ads. Then, they were randomly directed to one of the 16 created websites to watch the brand's video ad and comments. After viewing was complete, all participants were directed to another questionnaire probing their ad-related evaluations.

Measurements

Unless otherwise indicated, all items were measured on a 7-point Likert scale, where 1 = *Strongly disagree* and 7 = *Strongly agree*.

Manipulation Validation

Perceived humor. We measured perceived humor using a 7-point bipolar scale adapted from Nabi, Moyer-Gusé, and Byrne (2007). A sample word pair follows: *Not funny/Funny* (Cronbach's $\alpha = .94$, $M = 4.84$, $SD = 1.83$).

Covariate

Involvement. We measured participants' involvement with both the brand (Cronbach's $\alpha = .96$, $M = 4.05$, $SD = 1.57$) and product (Cronbach's $\alpha = .97$, $M = 4.42$, $SD = 1.75$) with 10 items derived from Zaichkowsky (1994). Items were measured on a 7-point semantic differential scale. A sample word pairs follows: *Means nothing to me/Means a lot to me*. Then, we took the mean of these two variables to create a composite variable representing participants' involvement with what had been advertised (Cronbach's $\alpha = .96$, $M = 4.23$, $SD = 1.47$). To make sure our stimuli ads did not differ on aspects other than humor elements, we statistically controlled this variable throughout the following data analyses.

Mediating Variables

Perceived interactivity. Five items were selected from an established scale (McMillan and Hwang 2002) to measure perceived interactivity of the video. A sample item follows: "This video format was interactive" (Cronbach's $\alpha = .85$, $M = 4.28$, $SD = 1.43$).

Social presence. Social presence was measured with four items used in Hwang and Lim (2015). A sample item follows: "When watching the advertisement, I felt like many people were watching at the same time" (Cronbach's $\alpha = .91$, $M = 3.97$, $SD = 1.85$).

Perceived intrusiveness. We measured perceived intrusiveness with seven items derived from Edwards, Li, and Lee (2002). The question "When watching the advertisement, to what extent did you find its user comments as …?" had, as a sample item response, "Distracting" (Cronbach's $\alpha = .95$, $M = 3.04$, $SD = 1.82$).

Dependent Variables

Attitude. Seven semantic differential items (Price, Axsom, and Coupey 1997) were used to evaluate participants' attitudes respectively toward the ad (Cronbach's $\alpha = .95$, $M = 5.25$, $SD = 1.52$), toward the brand (Cronbach's $\alpha = .97$, $M = 5.05$, $SD = 1.59$), and toward the advertised product (Cronbach's $\alpha = .97$, $M = 4.95$, $SD = 1.66$). Sample word pairs included *Do not like it/Like it* and *Not desirable/Desirable*.

Results

Manipulation Validation

To validate the legitimacy of our choices of ads in the main study, we compared the perceived humor in nonhumor ads and that in humorous ads using independent samples t tests. The analysis revealed that humor ads ($M = 5.45$, SE = .11) were rated as significantly funnier than nonhumor ads ($M = 4.21$, SE = .11), t (516) = 8.19, $p < .001$, one-tailed. Therefore, we consider our manipulations to have successfully worked in the expected direction.[3]

Table 1. Descriptive statistics of measured variables for all experimental conditions.

	M (*SD*)							
Variable	1	2	3	4	5	6	7	8
Involvement	4.48 (1.39)	4.30 (1.37)	4.33 (1.30)	4.19 (1.50)	3.93 (1.53)	3.96 (1.57)	4.02 (1.61)	4.71 (1.34)
Perceived humor	4.36 (1.72)	4.24 (1.67)	3.98 (1.69)	4.27 (1.90)	5.42 (1.86)	5.63 (1.63)	5.38 (1.59)	5.34 (1.77)
Perceived interactivity	4.03 (1.54)	4.16 (1.32)	4.14 (1.48)	4.50 (1.55)	3.97 (1.48)	4.17 (1.36)	4.70 (1.24)	4.64 (1.38)
Social presence	3.73 (1.83)	3.72 (1.88)	4.00 (1.94)	4.31 (1.97)	3.46 (1.83)	3.63 (1.75)	4.62 (1.79)	4.43 (1.54)
Perceived intrusiveness	2.75 (1.71)	2.82 (1.66)	3.41 (1.95)	3.32 (1.95)	2.45 (1.45)	2.45 (1.46)	3.53 (1.91)	3.84 (2.06)
Attitude toward ad	5.44 (1.47)	5.16 (1.55)	4.85 (1.57)	5.48 (1.31)	5.32 (1.65)	5.41 (1.56)	5.27 (1.47)	5.08 (1.53)
Attitude toward product	5.19 (1.53)	4.99 (1.70)	4.89 (1.58)	4.84 (1.73)	4.93 (1.84)	4.98 (1.59)	4.88 (1.70)	4.93 (1.59)
Attitude toward brand	5.35 (1.39)	5.06 (1.54)	4.78 (1.61)	4.96 (1.70)	5.03 (1.84)	5.10 (1.57)	5.09 (1.44)	5.00 (1.66)

Note. 1 = Nonhumor ad + No barrage + Comment not cueing humor; 2 = Nonhumor ad + No barrage + Comment cueing humor; 3 = Nonhumor ad + Barrage + Comment not cueing humor; 4 = Nonhumor ad + Barrage + Comment cueing humor; 5 = Humor ad + No barrage + Comment not cueing humor; 6 = Humor ad + No barrage + Comment cueing humor; 7 = Humor ad + Barrage + Comment not cueing humor; 8 = Humor ad + Barrage + Comment cueing humor.

Table 2. Summary of univariate analysis of covariance.

	Perceived Interactivity	Social Presence	Perceived Intrusiveness	Attitude toward Ad	Attitude toward Brand	Attitude toward Product
Danmaku	F (1, 509) = 9.58, p = .002, η^2 = .018	F (1, 509) = 18.83, p < .001, η^2 = .036	F (1, 509) = 33.18, p < .001, η^2 = .061	F (1, 509) = 2.92, p = .088, η^2 = .006	F (1, 509) = 5.41, p = .020, η^2 = .011	F (1, 509) = 4.24, p = .040, η^2 = .008
Ad type	F (1, 509) = 3.34, p = .068, η^2 = .007	F (1, 509) = 1.64, p = .201, η^2 = .003	F (1, 509) = .001, p = .980, η^2 = .000	F (1, 509) = .59, p = .444, η^2 = .001	F (1, 509) = 1.23, p = .267, η^2 = .002	F (1, 509) = .39, p = .533, η^2 = .001
Comment	F (1, 509) = 1.15, p = .284, η^2 = .002	F (1, 509) = .02, p = .894, η^2 = .000	F (1, 509) = .19, p = .660, η^2 = .000	F (1, 509) = .05, p = .828, η^2 = .000	F (1, 509) = .68, p = .410, η^2 = .001	F (1, 509) = .87, p = .351, η^2 = .002
Danmaku × Ad type	F (1, 509) = .74, p = .392, η^2 = .001	F (1, 509) = .76, p = .384, η^2 = .001	F (1, 509) = 3.93, p = .048, η^2 = .008	F (1, 509) = .84, p = .359, η^2 = .002	F (1, 509) = .03, p = .866, η^2 = .000	F (1, 509) = .77, p = .382, η^2 = .002
Danmaku × Comment	F (1, 509) = .30, p = .582, η^2 = .001	F (1, 509) = .50, p = .480, η^2 = .001	F (1, 509) = .03, p = .866, η^2 = .000	F (1, 509) = .58, p = .446, η^2 = .001	F (1, 509) = .08, p = .776, η^2 = .000	F (1, 509) = .52, p = .469, η^2 = .001
Ad type × Comment	F (1, 509) = 2.02, p = .156, η^2 = .004	F (1, 509) = 2.24, p = .135, η^2 = .004	F (1, 509) = .22, p = .643, η^2 = .000	F (1, 509) = 2.42, p = .121, η^2 = .005	F (1, 509) = 1.40, p = .238, η^2 = .003	F (1, 509) = .60, p = .439, η^2 = .001
Danmaku × Ad type × Comment	F (1, 509) = 2.15, p = .143, η^2 = .004	F (1, 509) = 3.08, p = .080, η^2 = .006	F (1, 509) = .52, p = .472, η^2 = .001	F (1, 509) = 7.58, p = .006, η^2 = .015	F (1, 509) = 4.99, p = .026, η^2 = .010	F (1, 509) = 1.59, p = .208, η^2 = .003

Note. η^2 is partial η^2.

Testing the Effect of Danmaku

Descriptive statistics of all measured variables for all experimental conditions are listed in Table 1. To test the effect of danmaku on advertising effectiveness, we first conducted an omnibus multivariate analysis of covariance (MANCOVA) with three attitudinal variables and three perceptual variables as dependent variables and involvement as the covariate. The analysis revealed a significant main effect of danmaku, Wilks's Λ = .88, F (6, 504) = 11.66, p < .001, partial η^2 = .122. The following sections further present the follow-up univariate analyses of covariance (ANCOVAs) and discuss our findings.

The Effect of Danmaku Format

As shown in Table 2, the follow-up univariate ANCOVAs revealed main effects of danmaku format on consumer perceptions for perceived interactivity, social presence, and perceived intrusiveness. Specifically, danmaku comments elicited significantly more perceived interactivity (M = 4.47, SE = .09) and higher social presence (M = 4.30, SE = .11), but also higher levels of perceived intrusiveness (M = 3.52, SE = .11) than watching ads without danmaku comments (perceived interactivity: M = 4.10, SE = .08; social presence: M = 3.67, SE = .10; perceived intrusiveness: M = 2.62, SE = .11). Therefore, hypotheses 1, 3, and 5 were supported.

To examine the psychological processing of danmaku humor ads, we employed Model 4 from PROCESS 3 in SPSS (Hayes 2018) to request simple mediation analysis, with danmaku as the independent variable; perceived interactivity, social presence, and perceived intrusiveness as parallel mediating variables; three attitudinal variables as the dependent variable, respectively; and involvement as the covariate. We requested the bootstrapping procedure of 5,000 samples with 95% confidence interval (CI).

Table 3 reports the mediation analysis statistics. In partial support of hypotheses 4(a), 4(b), and 4(c), watching danmaku ads significantly increased social presence, resulting in more favorable attitudes. At the same time, it also significantly increased perceived intrusiveness, which led to more negative attitudes, which is somewhat consistent with hypotheses 6(a), 6(b), and 6(c). However, the mediation paths via perceived interactivity were not significant; thus, hypotheses 2(a), 2(b), and 2(c) were not supported.

Table 3. Parallel mediation via perceived interactivity, social presence, and perceived intrusiveness on consumer attitudes.

	Attitude toward Ad	Attitude toward Brand	Attitude toward Product
Direct effect	$B = -.28$, SE = .11, $p = .014$	$B = -.38$, SE = .11, $p < .001$	$B = -.30$, $SE = .11$, $p = .007$
Indirect effect			
Perceived interactivity	$B = .01$, boot SE = .02, 95% CI [−.02, .07]	$B = -.01$, boot SE = .02, 95% CI [−.06, .03]	$B = -.02$, boot SE = .02, 95% CI [−.08, .01]
Social presence	$B = .24$, boot SE = .06, 95% CI [.13, .38]	$B = .22$, boot SE = .06, 95% CI [.12, .35]	$B = .21$, boot SE = .06, 95% CI [.11, .34]
Perceived intrusiveness	$B = -.18$, boot SE = .04, 95% CI [−.28, −.12]	$B = -.09$, boot SE = .03, 95% CI [−.16, −.04]	$B = -.12$, boot SE = .03, 95% CI [−.19, −.12]
Total effect	$B = -.21$, SE = .13, $p = .095$	$B = -.26$, SE = .12, $p = .025$	$B = -.23$, SE = .12, $p = .045$

Note. The independent variable: danmaku, 0 = non-danmaku, 1 = danmaku.

Table 4. Mean difference for three-way interaction effects.

	Comment Not Cueing Humor			Comment Cueing Humor		
	Non-Danmaku	Danmaku	Simple Effect	Non-Danmaku	Danmaku	Simple Effect
Perceived Interactivity						
Nonhumor ad	3.95 (.17)	4.11 (.17)	F (1, 509) = .43, $p = .514$, $\eta^2 = .001$	4.14 (.16)	4.51 (.18)	F (1, 509) = 2.47, $p = .116$, $\eta^2 = .005$
Humor ad	4.06 (.16)	4.77 (.17)	F (1, 509) = 9.29, $p = .002$, $\eta^2 = .018$	4.26 (.16)	4.49 (.18)	F (1, 509) = .92, $p = .339$, $\eta^2 = .002$
Social presence						
Nonhumor ad	3.59 (.21)	3.94 (.21)	F (1, 509) = 1.43, $p = .232$, $\eta^2 = .003$	3.68 (.20)	4.33 (.21)	F (1, 509) = 5.08, $p = .025$, $\eta^2 = .010$
Humor ad	3.62 (.20)	4.73 (.20)	F (1, 509) = 15.35, $p < .001$, $\eta^2 = .029$	3.77 (.20)	4.17 (.22)	F (1, 509) = 1.85, $p = .175$, $\eta^2 = .004$
Perceived intrusiveness						
Nonhumor ad	2.73 (.22)	3.41 (.23)	F (1, 509) = 4.57, $p = .033$, $\eta^2 = .009$	2.82 (.21)	3.32 (.23)	F (1, 509) = 2.58, $p = .109$, $\eta^2 = .005$
Humor ad	2.47 (.21)	3.54 (.22)	F (1, 509) = 12.26, $p = .001$, $\eta^2 = .024$	2.47 (.21)	3.82 (.23)	F (1, 509) = 18.24, $p < .001$, $\eta^2 = .035$
Attitude toward ad						
Nonhumor ad	5.36 (.18)	4.81 (.18)	F (1, 509) = 4.54, $p = .034$, $\eta^2 = .009$	5.14 (.17)	5.49 (.19)	F (1, 509) = 1.86, $p = .174$, $\eta^2 = .004$
Humor ad	5.42 (.17)	5.34 (.18)	F (1, 509) = .11, $p = .744$, $\eta^2 = .000$	5.50 (.17)	4.92 (.19)	F (1, 509) = 5.22, $p = .023$, $\eta^2 = .010$
Attitude toward brand						
Nonhumor ad	5.19 (.16)	4.72 (.17)	F (1, 509) = 4.13, $p = .043$, $\eta^2 = .008$	5.01 (.16)	4.98 (.17)	F (1, 509) = .01, $p = .917$, $\eta^2 = .000$
Humor ad	5.22 (.16)	5.22 (.16)	F (1, 509) = .00, $p = .990$, $\eta^2 = .000$	5.28 (.16)	4.70 (.17)	F (1, 509) = 6.14, $p = .014$, $\eta^2 = .012$
Attitude toward product						
Nonhumor ad	5.02 (.17)	4.82 (.17)	F (1, 509) = .72, $p = .395$, $\eta^2 = .001$	4.94 (.16)	4.86 (.17)	F (1, 509) = .104, $p = .747$, $\eta^2 = .000$
Humor ad	5.14 (.16)	5.02 (.16)	F (1, 509) = .24, $p = .627$, $\eta^2 = .000$	5.17 (.16)	4.60 (.17)	F (1, 509) = 5.92, $p = .015$, $\eta^2 = .011$

Note. Mean and standard error are listed for each condition; η^2 is partial η^2.

The Effect of Ad Type and Comment Content

As shown in Table 2, we observed a significant two-way interaction between danmaku and ad type on perceived intrusiveness. When watching the nonhumor ad, participants perceived the danmaku condition ($M = 3.36$, SE = .16) as more intrusive than the no-danmaku condition ($M = 2.78$, SE = .15), $p = .008$. When watching the humor ad, the discrepancy became more salient, such that the danmaku condition ($M = 3.68$, SE = .16) was perceived as more intrusive than the no-danmaku condition ($M = 2.47$, SE = .15) to a greater extent, $p < .001$. This two-way interaction provided more nuanced insights into the main effect of danmaku on perceived intrusiveness as previously reported.

Furthermore, in answering research questions 2(a), 2(b), 2(c), 4(a), 4(b), and 4(c), the follow-up univariate ANCOVA revealed a significant three-way interaction effect on attitude toward ad and attitude toward the brand. More specifically, as shown in Table 4, for humor ads, when comments cued the humor, participants held significantly more favorable attitudes toward no-danmaku ads ($M = 5.50$, SE = .17) than danmaku ads ($M = 4.92$, SE = .19), $p = .023$. When comments did not cue the humor, however, the significant difference diminished (no-danmaku ads: $M = 5.42$, SE = .17; danmaku ads: $M = 5.34$, SE = .18), $p = .744$. When it comes to attitude toward the brand, Table 4 similarly reveals that participants' attitude toward the danmaku ads turned out to be more positive as compared to the no-danmaku ads if the ad content and the comment content were incongruent. Except for these, we did not find other significant interaction effects on outcome variables. To answer research questions 3(a), 3(b), and 3(c), we employed Model 11 of PROCESS 3 (Hayes 2018) with ad type and comment content as two moderators of the first stage of mediation, and the rest set up the same as previously mentioned. We found that for attitude toward ads, significant conditional indirect effects occurred via social presence and perceived intrusiveness when ad content (nonhumor versus humor) was inconsistent with that of comments (not cueing humor versus cueing humor), as reported in Table 5.

Table 5. Conditional indirect effect via perceived interactivity, social presence, and perceived intrusiveness on attitude toward ad.

	Ad Type	Comment Type	Indirect Effect
Perceived interactivity	Nonhumor ad	Comment not cueing humor	$B = .01$, Boot $SE = .02$, 95%CI [−.01, .07]
		Comment cueing humor	$B = .02$, Boot $SE = .03$, 95%CI [−.02, .10]
	Humor ad	Comment not cueing humor	$B = .03$, Boot $SE = .04$, 95%CI [−.04, .13]
		Comment cueing humor	$B = .01$, Boot $SE = .02$, 95%CI [−.01, .09]
Social presence	Nonhumor ad	Comment not cueing humor	$B = .13$, Boot $SE = .12$, 95%CI [−.08, .37]
		Comment cueing humor	$B = .25$, Boot $SE = .12$, 95%CI [.02, .51]
	Humor ad	Comment not cueing humor	$B = .42$, Boot $SE = .12$, 95%CI [.22, .67]
		Comment cueing humor	$B = .15$, Boot $SE = .11$, 95%CI [−.05, .37]
Perceived intrusiveness	Nonhumor ad	Comment not cueing humor	$B = -.14$, Boot $SE = .07$, 95%CI [−.30, −.01]
		Comment cueing humor	$B = -.11$, Boot $SE = .07$, 95%CI [−.25, .02]
	Humor ad	Comment not cueing humor	$B = -.22$, Boot $SE = .07$, 95%CI [−.39, −.10]
		Comment cueing humor	$B = -.28$, Boot $SE = .08$, 95%CI [−.47, −.15]

Specifically, the effect of the form of danmaku via the mechanism of social presence was significant only when the ad content and comment content were incongruent. If incongruent, compared to no-danmaku ads, danmaku ads led participants to perceive a significantly higher level of social presence, thus resulting in more favorable attitudes toward the ad, the brand, and the product.

The effect of the form of danmaku via the mechanism of perceived intrusiveness, instead, was not so much subject to the congruency between ad content and comment content. However, while in most cases participants perceived danmaku ads as more intrusive, which resulted in a negative attitude, the effect of perceived intrusiveness was not significant if comments cueing humor were attached to nonhumor ads. Similar patterns were observed for attitude toward the brand and attitude toward the advertised product.

Summary of Findings

In summary, we found that compared to video ads that did not have danmaku, danmaku enhanced positive attitudes toward the ad and the brand if other viewers provided comments that were incongruent with the ad content, such as commenting on funny aspects of nonhumor ads or leaving comments about not being amused by humor ads. In particular, participants' intensified social presence as a result of such contrast enhanced positive consumer responses, but sense of intrusiveness compromised such positivity.

Discussion

Effect of Danmaku in Advertising

Many video websites have incorporated the danmaku feature into their website interface designs to improve user experience (Ni 2017). In light of the potential of danmaku in enhancing viewing experience, we tested the effect of danmaku in online advertising practices.

Negative Danmaku Effect Overall

In the present study, we found that regardless of ad types and user comments, ads with danmaku undermined potential consumers' attitudes toward the brand and the product promoted in the ads (see Table 1), which is inconsistent with existing findings in the context of online learning and entertainment observed within East Asian samples. One explanation is that, unlike online learning or watching entertainment videos, video ads are usually short in length. In our study, participants needed to process information from both ad content and danmaku comments within a short period of time (i.e., 30 seconds). Thus, danmaku might have overwhelmed participants, resulting in cognitive overload. Another potential explanation rests in cultural differences. Although danmaku has been especially welcomed in East Asian countries, such as China and Japan, where the cultures are more collectivistic, participants in our sample are located in the United States, where individualism dominates (Goodrich and de Mooij 2014). According to Triandis (2001), compared to those who identify with collectivistic values, those born in individualistic cultures tend to value content (i.e., ad content in our study) more than context (i.e., danmaku platform in our study) in social interactions. Therefore, the need for content viewing might be dissatisfied by the presence of danmaku for participants in our sample, which led to more negative evaluations of the brand that incorporated danmaku to promote its product.

Incongruity Can Alter Consumer Perceptions and Attitudes

Aside from media format, media content also matters (Daugherty et al. 2017). We found that when comment content was at odds with ad content, a overall negative danmaku effect could be remedied. We further found that for humor ads, while nonhumor danmaku comments elicited higher level of social presence and perceived intrusiveness as expected,

humorous danmaku comments only induced more of the latter. One explanation could be that humorous danmaku comments acted as a "spoiler" to set the tone for participants before they finished watching the entire ad. As a result, by taking away participants' freedom to express their own thoughts about the ad, it might generate psychological reactance and negative attitudes (Brehm 1966), which could be translated into a sense of intrusion to a greater extent.

Alternatively, the incongruity between an ad and a comment might induce more social presence as a result of expectancy violation (Burgoon and Hale 1988). If participants' feelings did not correlate with nonhumorous danmaku comments, it might make the presence of others in social interactions more salient to foster more positive consumer attitudes. At any rate, our findings did not substantiate the effect of emotional contagion as argued for danmaku content cueing humor. Instead, incongruence between the ad and the comments stood out to allow danmaku to exert more influence over both perceptual and attitudinal outcomes.

The Salience of Social Presence

In examining how consumers would psychologically process danmaku ads, we found that enhanced social presence brought by danmaku could mitigate the negativity to some degree. Most research on computer-mediated communication (CMC) found that a higher level of social presence predicts more satisfaction (e.g., Gunawardena and Zittle 1997) because users favor relational cues to foster sufficient information exchange in mediated environments (Walther 1992). In the danmaku system, seeing comments projected on top of a video ad successfully cued the existence of social interaction, which helped to create a sense of coviewing with other consumers at the same time. Heightened social presence, consistent with past findings in the context of teleconferencing (e.g., Gunawardena 1995) and distant learning (e.g., Tu and McIsaac 2002), is associated with more favorable consumer attitudes. However, danmaku was also perceived as intrusive. Such intrusiveness led to negative attitudes toward the brand and the product.

When the effects of perceived interactivity, social presence, and perceived intrusiveness were controlled for, we observed significant direct negative effects of danmaku on consumer attitudes. This finding suggests that other mediators might exist that account for the observed psychological effect of danmaku ads. For instance, as our participants were not familiar with the danmaku system, they might find watching danmaku ads a novel experience. The heightened sense of novelty, then, could help shift consumer attitudes toward the positive direction. Cognitive overload could be another potential mediator. Watching danmaku ads could demand too much cognitive effort from consumers, resulting in negative evaluations of the overall experience projected into the ad, the brand, and the product.

Contrary to our prediction, although danmaku ads were regarded as more interactive than ads without danmaku, we did not find perceived interactivity as a salient mediator throughout, which suggests that the cue route of interactivity, that is, merely viewing danmaku comments rather than composing them, might not be sufficient to induce more favorable consumer attitudes in the current context. If consumers are able to create danmaku comments themselves (i.e., the action route; see TIME; Sundar et al. 2015), they might experience a higher level of interactivity, which might potentially enhance consumer attitudes.

Theoretical Implications

The present study contributes to the theoretical understanding of the effect of technological affordances on affect-charged advertising effectiveness. First, in light of more favorable consumer responses resulted from the incongruity between ad content (i.e., humor or not) and comment content (i.e., cueing humor or not), we found more support for the incongruity effect in advertising research (Jurca and Madlberger 2015). This finding shows the contextual effects of technology in building affective ties among consumers and how some level of incongruity might make consumers more sensitive to ad messages transmitted in online environments.

Second, informed by the TIME model (Sundar et al. 2015), we focused on the cue route of the danmaku effect: We speculated that merely viewing (instead of posting) danmaku could trigger one's interactivity-related heuristics, as suggested by the MAIN model (Sundar 2008). However, we found the higher level of perceived interactivity induced by danmaku ads, compared to a regular video ads, was not sufficient to influence consumer attitudes, which suggests the necessity of the action route, that is, to enable consumers' to post danmaku comments themselves. In facilitating interactive advertising, then, it suggests the importance of enabling the action route by encouraging consumers to actively engage interactivity affordances.

Third, social presence as a salient psychological predictor of consumers' attitudes suggests the critical role of social interactions in interactive advertising. Extending previous works on social presence (e.g., Hassanein and Head 2007), our findings demonstrate that danmaku can considerably satisfy consumers' need for being virtually together online, which implicates the social nature of interactive advertising. Thus, advertising research might benefit from more closely investigating how technology can foster communication among consumers to increase advertising effectiveness.

Practical Implications

Findings in this study have practical implications for the advertising industry. To begin with, we found that incongruity between ad content and user comments can increase danmaku advertising effectiveness. Hence, advertisers do not necessarily need to filter out incongruent comments, as is commonly done in practice. Our study found that incongruent comments should be more conducive to online advertising, particularly with danmaku format implemented.

Second, we found social presence as a salient psychological mechanism leading to more favorable consumer attitudes, such that the mere perception of others' presence can induce positive reactions in interactive advertising. Hence, advertisers could consider developing other tools that are similar to danmaku's functionality to generate a higher sense of social presence. For instance, Jung and colleagues (2017) found some users were sensitive to location-based information cues that led to more social presence perceptions. Therefore, advertisers are encouraged to explore more meaningful strategies like this for future practices.

Third, in light of the contextual effects we observed, platforms should design danmaku features that enhance social presence but also minimize perceived intrusiveness. For instance, advertisers might consider letting danmaku comments scroll only in certain areas of the video, without blocking the video content, or allowing consumers to decrease the size of danmaku comments to optimize their viewing experience.

Finally, ethical concerns arise when advertisers try to curate danmaku comments. If advertisers select only incongruent danmaku comments to induce favorable consumer attitudes, it violates consumers' right to know (Nebenzhal and Jaffe 1998). In the long run, such unethical operations could create backlash by turning consumers against the advertisers. Therefore, it is important to balance the pros and cons of using the danmaku system in advertising, as well as to execute it with ethical implications in mind.

Limitations and Future Work

Several limitations could be addressed in future research. First, due to limited resources, selected humor ads and nonhumor ads were edited based on existing ads, so they differed from each other not only in terms of the presence of humor elements but also in regards to brands, products, and endorsers. Although we tried to eliminate potential confounding effects by using two ads (rather than just one) in each condition, we encourage researchers to exert stronger control with more precisely manipulated ad stimuli by creating ads equivalent in respects other than the independent variable in the future. In addition, some nonhumor comments are ambiguous; for example, "Feels like a clever one" might be perceived as the commenter having recognized humor in the ad, that is, a comment cueing humor. Although the majority of the comments are not as ambiguous as this one, future research should exert more rigorous control over the content of the comments.

Second, we examined the effect of danmaku through perceived interactivity, social presence, and perceived intrusiveness. However, as mentioned, the observed partial mediation suggests other mediators might operate to influence consumer attitudes as well. Future work could continue this line of inquiry by examining other variables of psychological processes such as cognitive overload.

Third, the current article mainly focused on the general advertising effectiveness influenced by advertising delivery (i.e., danmaku) and how the effect was moderated by content factors (i.e., ad type and comment content), but it did not attend to consumer characteristics. Understanding the impact of individual differences in future research could help to segment audiences when launching the ads to the market by applying specific strategies to appeal to potential consumers.

Finally, we did not include any attention-check questions in the questionnaire. As suggested by Qualtrics (Vannette 2017), attention-check questions might worsen participants' behaviors in the study, which might lead us to underestimate the true effect size. That said, by setting relatively high reputation criteria for participants (i.e., only those who has completed at least 50 HITs and with a HIT approval rating to be at least 80%), it might have helped us

recruit participants who tend to pay more attention (Liu and Sundar 2018) and to some extent obviate attention checks (Finley, Naaz, and Goh 2018; Peer, Vosgerau, and Acquisti 2014). In addition, by checking the correlation between reverse-coded items and regular items, the negative correlations suggest that "straightliners" did not dominate the data. Nevertheless, we encourage future researchers to experiment with consumers' responses toward danmaku ads in a controlled laboratory setting, where the more controlled environment can facilitate participants to pay more attention.

Despite these limitations, we believe the findings in our study contribute to research on interactive advertising by testing a novel feature of interactivity: danmaku. The findings are applicable to future development of website interface design. Therefore, the field calls for more research to validate the use of danmaku in enhancing consumers' online engagement and nurturing favorable consumer attitudes.

Conclusion

Through an online experiment, we sought to answer whether embedding the danmaku feature in ads could generate more favorable consumer attitudes toward ads, brands, and products. We found that, overall, using danmaku has a negative effect on consumer attitudes when compared to regular video ads. Nevertheless, when ad content and comment content are incongruent, danmaku format enhances positive consumer attitudes toward brands and products as a result of elevated social presence. When incorporating danmaku feature in practice, advertisers should consider taking measures to enhance social presence while minimizing the degree to which danmaku comments interfere with audiences' processing of the ad content.

Notes

1. A full list of danmaku comments in the stimuli was not included in this article for parsimony. They are available upon request from the corresponding author.
2. In addition to the three variables described in this section, the study has a fourth independent variable—commentability—operationalized as whether or not to allow participants to enter their own comments while watching the ad. In particular, if they were instructed to enter a danmaku comment, they could see their own comment instantly scrolling and overlaying the video once submitted. For those who could not comment, the comment submission box was not displayed. However, our data suggest that being able to enter comments did not yield significantly higher perceived interactivity ($M = 4.39$, SE = .09) than not being able to do so ($M = 4.27$, SE = .09), t (516) = .17, p = .435, one-tailed. This finding possibly indicates unsuccessful experimental manipulation, and technical problems prevented us from tracking whether those who had been assigned to enter comments actually did so. Therefore, we were not able to know to what extent making comments with danmaku was critical to foster positive consumer attitudes. Hence, we decided not to include the variable commentability and focused on the other three variables throughout the article. That said, future research could further examine the role of action in the danmaku system in cultivating desirable attitudes and behavioral intentions toward the brands and products.
3. We prepared two ads for the humor-ad condition and the nonhumor-ad condition to increase the study external validity. Therefore, we anticipated that between Smirnoff and Chinet, and between Heineken and GameStop, elicited perceived humor would not significantly differ. To check this, we performed a univariate analysis of variance, which showed that Smirnoff ($M = 4.16$, SE = .15) and Chinet ($M = 4.27$, SE = .15) did not significantly differ (p = .619), and Heineken ($M = 5.46$, SE = .15) and GameStop ($M = 5.45$, SE = .15) did not significantly differ (p = .952) on perceived humor. We then consider the two ads within each condition equivalent in their ability to induce humor or not, thus combining Smirnoff with Chinet, and Heineken with GameStop, should not present confounding effects across different ads.

ORCID

Lewen Wei http://orcid.org/0000-0002-4387-2779
Tongxin Sun http://orcid.org/0000-0002-3395-2484
Bingjie Liu http://orcid.org/0000-0001-9019-8521

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Appendix A. Sample Danmaku Ad