

Understanding How Digital Gifting Influences Social Interaction on Live Streams

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ABSTRACT

Digital gifting in live streaming, in which viewers buy digital gifts to reward the streamers, was worth over \$200 million in 2018 in China and its growth has been accelerating. This paper explores what motivates people to tip and how it impacts interactions between viewers and streamers. Through a survey, we identified the main categories of viewers' tipping motivations. We found that viewers were motivated by the reciprocal acts of streamers, who would engage in various types of social interactions with tipplers during the live streams. The styles of interactions and contents of live stream based on the tipping are differently influenced by the motivations of viewers and streamers. For example, viewers often tip large to attract attentions from the crowd or promote preferred live-streaming content. These findings provide more knowledge on the social interaction in live streaming platforms.

CCS CONCEPTS

• Human-centered computing → Empirical studies in HCI.

KEYWORDS

Live Stream; Streamer; Gift-giving; Tipping; Viewer; Donate; Digital Gift

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1 INTRODUCTION

Live streaming is an emergent social medium that allows remote anytime/anywhere interaction through mobile phones. Beginning in 2016, major live-streaming platforms introduced a "tipping" feature (buying digital gifts to tip), which allows viewers to directly tip the streamers during live sessions. To do so on some platforms

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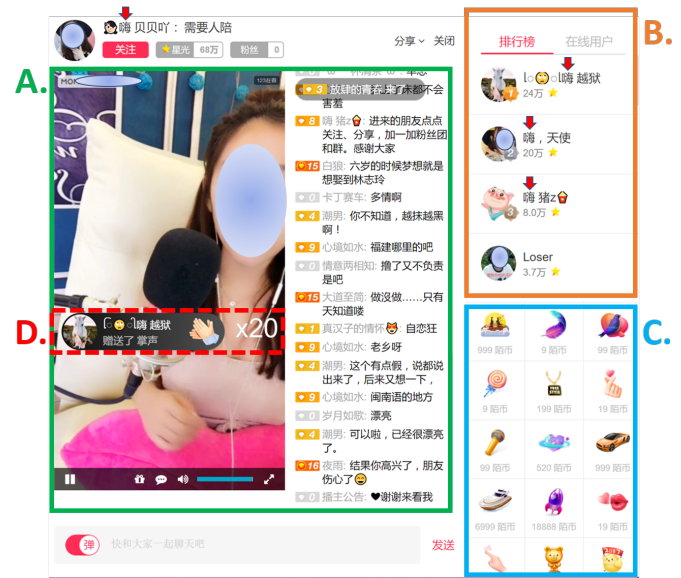


Figure 1: A live stream in Momo, including A. streaming video (left) and chatroom (right); B. ranking of generous tipplers and online viewers; C. listing of gifts with their prices; and D. a notification of who have tipped the broadcaster.

(e.g., Twitch), viewers simply need to type a predefined text in the chat room, whereas on others (e.g., Momo, Inke) they select a digital gift from a list and "send" it to the streamer. The money received through tipping is then shared between the streamers and the platforms. Therefore, live streaming is becoming one of the most popular mobile applications to share live experience instantly.

Over the past 15 months, tipping behavior has grown explosively. Between Twitch's launch of its tipping system in June 2016 and the end of that year, \$5.9 million in tips were collected on that platform alone. A live-streaming toolkit - streamlabs¹ - announced that their tipping reaches \$100M for the year (2018). The aggregate amount of tipping is even larger in China, where the top 10 streamers all earned more than \$700,000 from tipping in 2016 [6, 22]. In October 2016, a streamer performing a dance, received about \$150,000 in tips within one minute from a single adoring fan [1]. There are

¹<https://streamlabs.com/>

some websites² which disclose a ranking list of streamers based on their received tipping amount. This data reveals the trending of this live-streaming market. Although there were suspicions that this was just a marketing stunt masquerading as spontaneous viewer activity, there is no denying the importance of live-streaming tipping (digital gifting) in China as both an economic and psycho-social phenomenon.

Figure 1 illustrates a live-streaming platform that includes the design features of almost all such platforms that are currently available in China. Figure 1A is the main area for live streaming, which displays both streaming video and user messages. Figure 1B, meanwhile, indicates viewers' status and ranking of top tippers. Figure 1C presents a list of gifts with their prices; after a viewer selects a gift and presses the button, his/her gift is sent to the streamer immediately, and shown in the streaming video (Figure 1D). If viewers send the same digital gift multiple times, an animation will display the number of times repeatedly: in this case, 20.

Researchers have studied why users engaged in live streaming and how they used live stream in different life scenarios [10, 26]. However, few recent studies [16, 29] have explored viewers' motivations to reward (gift-giving[16], tipping [29]) streamers, and little research in live streaming has so far focused on the effect of gift-giving toward stream-viewer interaction. Thus, this paper attempts to explore how digital gifting influences the nature of their interactions in live streaming. As such, our work considerably expands knowledge of human interaction in contexts where online tipping (digital gift-giving) is available. It is guided by the following two research questions:

RQ1. Why are live-streaming viewers in China willing to tip streamers? The viewership of live-streaming platforms is rapidly growing in both numbers and intensity. Though live streaming is becoming popular in the U.S., the importance of live-streaming tipping as a new type of online social interaction is distinctively Chinese, and the reasons for this are worthy of much more scholarly attention than they have hitherto received.

RQ2. How does the design of digital gifts affect the interactions among streamers and viewers? Various HCI studies [12, 20] have addressed the interaction of co-watching in different contexts and interfaces [28], and it is apparent that such differences may impact users' engagement and even generate new types of social interactions [20]. Moreover, online tipping functions (digital gift) in live streams marks a new evolution to the changing of roles of streamers and viewers, not least because it gives the latter more opportunities to influence the content of streams. In addition, prior research [14, 27] studied gift-giving behaviors in mobile context, and they found that users might think sending text messages as sending gifts because the social interactions generated by texting mobile messages could resemble the interaction of gift-giving - feeling like an obligation to reciprocate when receiving messages/gifts from friends. Therefore, exploring the specifics of how the design of digital gifts affect the interaction in live streams is one of our key research goals.

2 BACKGROUND AND RELATED WORK

2.1 Live Streams

Twitch.tv is one of popular live-streaming platforms in the U.S. In 2011, its Gaming division which grew dramatically and attracted 10 million active daily users as of July 2017. This number is still dramatically increasing until today. In the beginning, Twitch.tv mainly specialized in video gaming live streams, but the platform expands their service and includes more kinds of live streams in recent years. Many live-streaming platforms for more general use entered the market around 2015. For example, Facebook began allowing celebrities to webcast live events through Facebook Live, which then became available for use by the public in January 2016. Youtube launched their live-streaming function in 2015 and allowed viewers to tip streamers (Youtubers). Periscope, a live-streaming platform owned by Twitter, was launched in May 2015. Helped by its integration into a mature social network, Periscope reached a record 2 million active daily users in January 2017 [2].

In China, the live-streaming market is flourishing and even bigger [22]. Beginning in 2015, around 200 Chinese live-streaming platforms had been launched by top business players, and included mobile live-streaming apps (e.g., Inke, Huajiao), PC-originated live-streaming platforms (e.g., YY Live), social media add-ons (e.g., Momo, Weibo), and e-commerce platforms (e.g., Taobao, Tmall), among others. This immense variety of live-streaming platforms has no parallel in the U.S. or other Western countries. Streamers dance, sing, chat or even just eat food in front of the camera, yet attract hundreds or thousands of viewers.

Live streamers in China are innovating rapidly. Apart from video gaming, one of the largest categories is personal performance: dancing, singing, or playing instruments, along with other, less common talents such as hoverboard dancing. Some Chinese streamers stage their own talk shows, or just chat with viewers informally, attracting them with their personal traits such as humor, beauty, quick wit, or wisdom. Another important category is socially interactive live streams. For example, a streamer might invite multiple viewers to participate in speed-dating, allowing them to ask each other questions or ask for support from the audience. Some streamers invite viewers to play multiplayer board games such as The Werewolves, while emphasizing the social aspects more than the rules or outcomes of the games themselves. Educational live streams are also popular. Topics have included how to cook regional cuisines, how to dance ballet, how to play certain video games, among many others. Other live streams are dedicated to advertising, and have attracted considerable attention from business companies, which hire top streamers to promote their products for few hours in hopes that the streamers' preexisting reputations will boost revenue.

2.2 Live-streaming Research

Tang et al. [26] studied the use of Meerkat and Periscope, two mobile live-streaming platforms, and found that the main categories of live-streaming content were chatting and showing objects, places, or events. They also interviewed frequent streamers about their motivations and practices. Haimson et al. [10] studied how people experienced Facebook Live, Periscope, and Snapchat Live Stories, and identified four dimensions that make remote event viewing on these platforms engaging: immersion, immediacy, interaction, and

²- e.g., <http://www.toubang.tv/> (in Chinese)

sociality. Pellicone and Ahn [21] collected qualitative data from a game streamer community to understand how gaming streamers organize their performance of play and how they interact with viewers. In addition, some streamers were eager to increase the number of viewers which can help them win a chance for partnership with Twitch, but there are tons of streams on the platform, it is hard for each streamer to stand out [21]. These studies provide a general picture of why live streaming becomes an emerging social media; however, the impact of live-streaming gift-giving was not clear.

While there are numerous live-streaming platforms in Asia countries with a great variety of content, most of platforms share one common feature: they all support live-streaming gift-giving, defined as a live-streaming viewer's voluntary donation of money to the streamer through the platform. This action is usually accomplished by purchasing and sending digital gifts or currencies to the streamer, and is commonplace across all the above-mentioned categories of live streams in China [16]. Viewers reward streamers when they sing well or display a remarkable level of video gaming skill; they tip their favored player in a competition in the hope that the tip could help that player win; they tip educational streamers when they learn something from them [29]. In other words, tipping has become tightly integrated with the live-streaming experience. Therefore, tipping has become a new kind of interaction on live-streaming platforms, and recently, there are few studies [13, 16, 29] started to investigate the impact of financial support in live-streaming.

Wohn et al. [29] indicated that viewers tended to give money to the streamers because of appropriating the streamed content and showing emotional attachment with the streamers. In addition, Lu et al. [16] gave more examples of how viewers used digital gifts to interact with streamers in China. Lee et al. [13] further analyzed live-streaming video to visualize the impact of different interaction behaviors for gift-giving in live streaming. Some studies [30, 31] crawled a large amount of data for live-streaming platforms, and they found that most digital gifts were bought by a small proportion of viewers, thus, drawing viewers' attention would be competitive among streamers. Yu et al. [30] indicated that socialization highly correlated with viewers' gift-giving behavior which implied that having good social interaction is a key to pursue digital gifts.

Although these studies have provided insight of gift-giving motivations, there were limited studies [11, 15, 21] explored live-streaming gift-giving from streamers' side. More specifically, prior studies [11, 21] focused on gameplay streamers and shed some light on how streamers constructed their live-streaming performance. Moreover, the findings of Pellicone and Ahn's research [21] revealed that the quantified metrics (viewership) displayed on a live-streaming room would directly affect the streamer's focus on their performance. The influence of gift-giving on live-streaming interaction has not been fully studied in prior literature. Previous studies [13, 16, 29] have pointed out the importance of gift-giving on live-streaming platforms, thus, this research further explores how digital gift-giving (tipping) impact social interaction in live streaming.

3 METHOD

The survey collected both quantitative and qualitative data, via seven multiple-choice and five open-ended questions. The questions were aimed at gaining an understanding of the viewers' background characteristics, why they liked to tip streamers, how they interacted with streamers, and how they decided their tip amounts. One of the open-ended survey questions was, *"Please explain what drives you to tip the streamers and provide examples. If you don't tip, please explain why not."* We also asked participants to indicate what types of live-streaming contents they like to watch. Moreover, we interested in how they chose digital gifts and how they used it on live-streaming platforms. Two of survey questions were, *"Please describe how much you paid for the gifting in general."* and *"Please describe when you would send an expensive digital gift and why."* In addition, we asked what live-streaming contents they liked watching and what live-streaming platforms they preferred to use. Finally, they were also encouraged to provide their account ID on the live-streaming platforms to verify their watching and digital-gifting experience (about 71% of participants did provide their account ID for us to verify information).

3.1 Participants

We recruited participants using SoJump [16], one of the major survey platforms in China, which can apply filters to the respondents' attributes. Our inclusion criterion was set to people who frequently watch live streams. In all, we obtained 357 survey responses (175 from females). Each participant was compensated with USD\$3 after the quality of his/her responses was deemed valid. Completion of the survey took 15 minutes on average. Our participants were from different live-streaming platforms in China, and we did not exclude any type of live-streaming viewers. The survey was conducted in Chinese, we later translated the results collected to English when organizing and presenting them in this paper.

3.2 Data Processing

For the data derived from each of the open-ended questions, we performed qualitative analysis by iteratively reviewing and labeling the responses with emerging codes [7], basing the initial codes on a review of the first 70 responses. If a response contained multiple concepts, it was split into multiple meaning units in a way that each could be labeled with a single code. Then, using the initial codes, three raters independently coded all the remaining responses. Their coding results were then compared to find disagreements, and they discussed possible revisions, including the addition of new codes where appropriate. Whenever the coding scheme was changed, each rater re-reviewed and labeled the responses again. This cycle was then repeated until the coding scheme was deemed satisfactory by all raters, and the inter-rater reliability was reasonable (>90%).

4 RESULT AND DISCUSSION

4.1 Demographics

There were 253 participants (123 females) reported they have spent money on tipping streamers, and 104 participants (52 females) reported they never tip or only tip free gifts. Figure 2 shows the

distribution of age, income, time spent on live streams, and frequency of tipping in reality. While there were no significant tipping differences associated with gender or channel preferences, we found that people who tipped were older ($\chi^2=19.3, p<.001$), had higher incomes ($\chi^2=62.6, p<.0001$), and spent longer watching live streams ($\chi^2=60.8, p<.0001$). In addition, the average tipping amount for a single live-streaming session across our participants is about \$9. Moreover, 42% participants indicated that they tended to tip more (range from \$20 to \$520) when there were special events, such as celebrating a streamer's birthday and supporting a streamer for the platform competition.

Nor were there any noteworthy differences in income distribution between female and male participants who tipped. However, the respondents who had higher incomes ($\chi^2=72.4, p<.0001$), were older ($\chi^2=33.1, p<.001$), and who spent more time watching live streams ($\chi^2=165.1, p<.0001$) tended to spend more money on tipping. In addition, the respondents who tipped in live streams also tended to tip more frequently in reality - e.g., in restaurants - than those who did not ($\chi^2=191.3, p<.0001$). This result could imply that live streams and offline tipping behavior might be driven by similar motivations.

There were 86% of participants preferred to watch showroom performances (e.g., singing, dancing, and chatting [16]), and 66% of participants liked to learn new skills/knowledge from live streams. 61% of subjects watched gaming live streams. 30% of subjects enjoyed participating in live-streaming interaction (e.g., playing game together, Blind dating), 11% of participants liked to watch ball game with others on live-streaming platforms. These five categories almost cover all types of live-streaming contents in China and some Asia countries, and obviously showroom performances is a primary live-streaming trends.

4.1.1 Who is Tippers. The reasons the respondents gave for their willingness to tip streamers can be divided into four dimensions: 1) *Content appreciation*, 2) *Interaction*, 3) *Learning*, and 4) *Providing support*. It should be noted, however, that these four dimensions overlap strongly with the more general reasons the respondents gave for viewing live streams, with or without tipping.

We analyzed the relation of the participants' background characteristics to their motivations for tipping. First, we found that there were no significant differences between the males' and females' incomes or tip amounts, though there were significant gender differences in tipping motivations ($\chi^2=9.3, p<.05$): with males more motivated by Interaction than females were, and females more motivated by Learning than males were. Second, the viewers who spent considerable time watching live streams said they tipped because of Content appreciation as well as Interaction. Those who spent less time viewing were more motivated by Learning. Third, the older participants were more motivated by Interaction to tip than the younger ones were ($\chi^2=31.8, p<.05$). No income-related differences in motivation to tip streamers were observed.

Furthermore, our analyses of the interactions between the participants' background characteristics and the five factors we proposed revealed that gender ($\chi^2=14.1, p<.05$) and frequency of tipping in face-to-face situations ($\chi^2=25.3, p<.05$) depended on different factors than decisions about tip amounts did: with a higher proportion

of females than males (37% vs. 21.5%) relying on their personal financial circumstances, and males more likely than females to decide based on their interactions with streamers (23.5% vs. 9.6%). Additionally, we found that respondents who seldom tipped in reality were less likely than others to think it was worthwhile to give large tips to streamers (24.5% vs. 10.2%). The participants who usually did tip in face-to-face situations, for their part, were more likely than others to take account of content quality when making tip-amount decisions related to streaming (39.8% vs. 23.3%).

4.2 Motivations to Reward streamers

4.2.1 The Variability and Authenticity of Live-streaming Content. Because there are various kinds of live-streaming platforms in China, viewers can access diverse topics based on their interests, such as dancing, singing, talk show, video gaming, and so forth. One participant explained:

"I like to watch the streamers sing a song, or tell some interesting stories. I can also get some new information from there." (ID=164, F)

Our survey responses also echoed prior research findings that linked the popularity of live-streaming viewing to its immersiveness and immediacy[10]. For example:

"Watching live streams could make me feel I was there, and I could interact with others immediately." (ID=139, M)

Many of the participants also characterized live streams as authentic, unedited, and unpredictable; therefore, they were engaging, especially when the streamer is a celebrity or otherwise appealing.

"You can see a 'true life' of a beautiful female in live streams, because the live streaming is unpredictable and without too much fabrication." (ID=128, F)

69.7% of the participants who said they tipped in live streams mentioned that they did so specifically because they were satisfied with the quality of the content: for example, if the streamer sang a song well, danced professionally, or displayed true skill in video game play.

"When the show was sensational, I would give tips and compliment the streamer on their performance. For example, I once tipped a streamer because she won a game and her singing was very pleasant to my ears." (ID=40, M)

In addition to those who were good performers, streamers that the participants deemed courteous and charismatic or good-looking had a higher chance of receiving tips, with 23% of the tip-giving respondents citing these reasons for their tipping.

"I prefer to tip the beautiful streamers who were polite and respected viewers during the streaming." (ID=155, M)

Our findings are partially in accord with the results of previous studies [4, 19] that investigated tipping behavior in the otherwise very different sphere of traditional service markets such as restaurants and hotels [18]. Live-streaming viewers often tip streamers when they appreciate the content of their streams, much as face-to-face tippers reward good-quality service by compensating servers [17, 23]. The findings of this study also suggest that viewers may tip

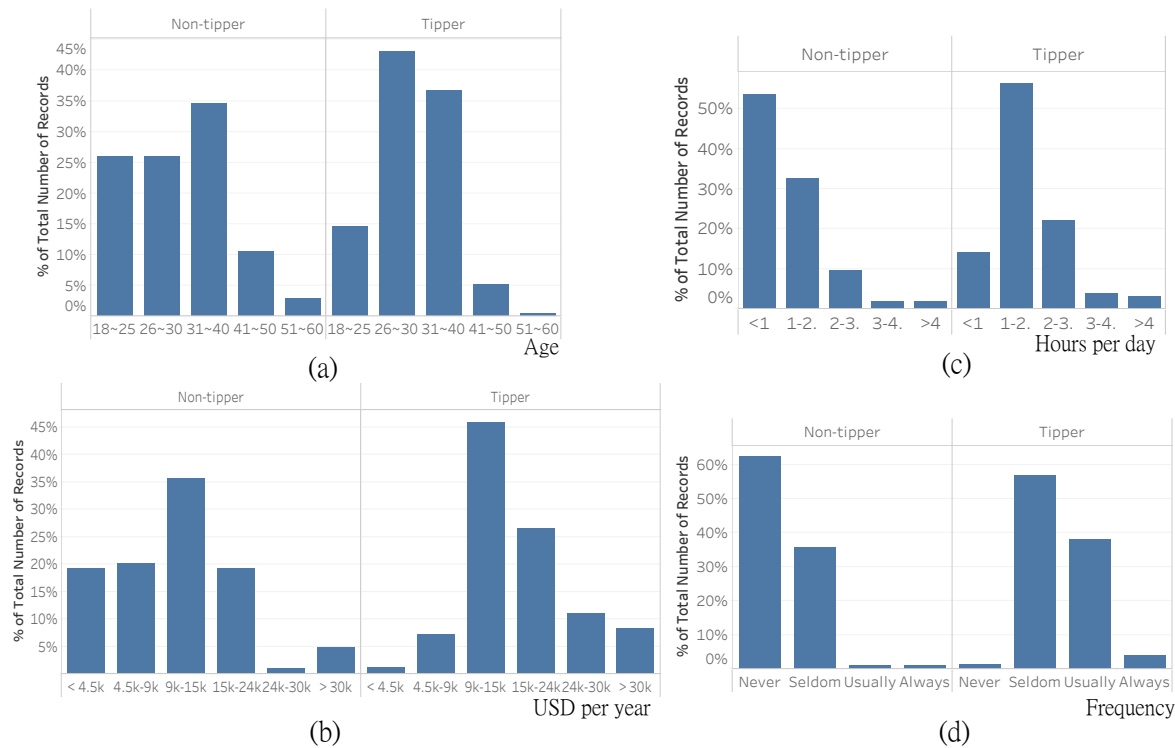


Figure 2: The distribution of (a) age, (b) income (c) time spent on live streams, and (d) frequency of tipping in reality

streamers in exchange for satisfaction they have obtained from the live streams: i.e., they tip streamers to maintain equitable exchange relationships [29].

Furthermore, many participants reported that the amount of tips they gave varied according to the quality of the streaming content they were watching. As one put it,

"Most live streams are not worth tipping much, because their content is quite superficial. I will tip more during a broadcast revealing that streamer put in lots of effort." (ID=80, F)

Moreover, viewers said that their personal preferences regarding the streamers' appearance and personality would "significantly" impact their tip amounts. For example, one participant said,

"I have tipped a streamer with expensive gifts, because I admired that streamer and follow her streaming for a while. I think the expensive gifts can demonstrate how I appreciate the streamer." (ID=510, F)

The quality of streaming content is a relatively subjective indicator for tip size. The situation is complicated by the findings of prior research in restaurant settings, which suggested that the relationship between service quality and tip size is weak [24] and that perceived service quality may be influenced by various factors such as customers' perceptions of servers' friendliness [8, 9] and emotions [5]. Likewise, in our survey, some participants said streamers' appearance and good personalities impacted on their tip

amounts; and these factors may contribute to their perceptions of content quality as well as the sizes of their tips.

4.2.2 Learning. Some streamers provide knowledge-based content: e.g., how to cook, dance, sing, or any other knowledge or skills that people might be interested in. Some knowledge-sharing Wikipedia-like platforms in China also support live audio streaming for real-time question-and-answer sessions. Because streamers can respond right away when a question is asked, many respondents felt that such platforms were beneficial to their learning.

"It is like learning something step by step with the streamers in person, so I like to watch live streams to learn some new skills." (ID=104, M)

Similarly, a large group of viewers enjoy watching live-streaming video gaming, with experienced players explaining their strategies and demonstrating their skills.

"For the sake of improving my gaming skill, I like to view game-related live streams because it's easy to learn something." (ID=162, F)

Our results also indicated that viewers were more likely to tip streamers if they can learn some new knowledge and skills through the streaming. Live streaming allows viewers to immediately interact with streamers. In knowledge-based live streams, streamers could answer viewers' questions or teach them step-by-step. Therefore, the learning process could be more efficient and enjoyable in such situations.

"One time I was cooking by following a streamer's recipe, but I couldn't make it successfully. So, I went back to ask the streamer, and she cooked the same dish again for me." (ID=518, F)

Furthermore, echoing their motivations for tipping vs. not tipping, the sizes of viewers' tips tended to be larger if they felt they had learned more. As one put it,

"I tip more when I believe the content is valuable and not easily accessible from anywhere else." (ID=534, M)

As for support, our data support the obvious inference that the more strongly viewers feel about supporting a streamer, the more money they will spend on doing so.

4.2.3 Providing Support. 13.3% of our participants stated that they tipped to express their support, especially when they believed the streamers had made considerable efforts and were well prepared. For example,

"the streamers spent six hours to stream an event. I felt it must be exhausting so I tipped to express my support." (ID=547, F)

Some also tipped streamers to encourage them to keep moving in what they considered to be the right direction, such as supporting charitable causes (one example given was helping poor students buy textbooks and stationery) or improving their streaming content.

"I tipped a streamer recently because he held a crowd-funding project to help students who live in a poor region to buy textbooks and stationery for their studies." (ID=36, M)

Tipping is also an expression of support. Our findings on this point from the live-streaming survey are also in line with prior research [29] that indicated tipping was motivated by a desire to help streamers and to give them incentives to deliver good-quality contents. The viewers of live streams may expect their tips to encourage the streamers to keep on engaging in behaviors that the viewers value, such as improving content quality and supporting charities.

4.2.4 Interaction. Most of live-streaming platforms allow viewers and streamers various modes of real-time interaction, including online messaging, digital gifting (tipping), and video chatting. Viewers can also chat with each other, and form online communities with those who share interests in the same streamers or topics. Nearly two-thirds of our survey respondents reported that interacting with streamers or other viewers was one of their motivations for watching live streams. One stated:

"I can make a lot of new friends and interact with them on the live-streaming platform. Sometimes, I like to share my life experience and discuss some topics with them." (ID=102, F)

Moreover, live streams enable users to interact with people who might be difficult to meet in their daily lives. As one participant noted:

"I'd also like to make friends with those beautiful ladies. Watching live streams of the pretty girls at home is so relaxing, not difficult like if you try to

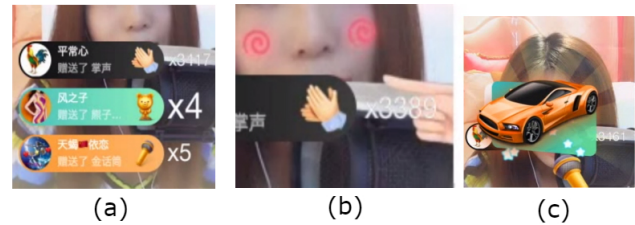


Figure 3: This figure shows (a) viewers' ID and gifts showed on the live stream, (b) "Poke face" animation and a viewer tipped the same gift 3389 times, and (c) animation for expensive gift

pick up girls on the streets. So why not [watch live streams]!" (ID=550, M)

Most of the participants who claimed they gave larger rewards ascribed this behavior to their experiences of direct interaction with streamers. Specifically, some streamers created chat groups for their viewers, and those viewers who tipped generously were more likely to be invited to join the groups. Once they were members, they could chat with each other at any time, even long after the stream had ended. It is also worth noting in this context that some viewers voluntarily built up online communities to support specific streamers, who in turn often interacted with these viewers even after their performances were finished. As one participant explained:

"It depends on my personal relationship with a streamer. If a streamer had a good interaction with me or even became a friend of mine, I would give larger tips." (ID=114, M)

Interaction with streamers could also play an important role in tip-amount variation. As previously noted, live streamers also routinely attempt to extend their interactions with their viewers to increase their tip amounts. Moreover, some viewers may increase their tip amounts specifically to attract an admired streamer's attention [30]. Such viewers' motivations therefore combine a desire to stand out from other viewers with a desire to build a strong connection with the performer.

4.3 Virtual Gift-based Interaction

A lot of interaction on live-streaming platforms are based on sending digital gifts, thus, we observed the digital gifting function in the platforms and summarized main interactions between viewers and streamers by using digital gifts:

4.3.1 "Now watch me tip!": In other social media systems, a user could like, comment, share, or subscribe to grab other user's attention. In addition to these functions, tipping has been perceived as an effective way to grab attention as money is involved. The tipping behaviors identified in our study included both the sending of numerous cheap gifts at the same time (Figure 3(a)(b)), and the giving of a few extremely expensive ones (Figure 3(c)). Live-streaming platforms usually design eye-catching animations that play on screen when a very expensive gift is given (Figure 3(c)). From our survey,

53% of viewers mentioned that one of their motivations to tip a streamer is to grab the attention of streamers and viewers. As one participant noted:

"I would give expensive gifts because I wanted to attract the streamer's attention and enhance my chance of exposure. I believe it can help me have an intimate relationship with the streamer." (ID=147, M)

After being tipped, streamers will often announce the tipper's name and thank him/her for the tips. Some respondents mentioned that they enjoy moments like these because other viewers will recognize them as big tippers:

"If you tip heavily, other viewers will notice you and I enjoyed standing out from the others. Moreover, when the streamer shouts out my name it makes me feel really satisfied." (ID=536, M)

4.3.2 Streamer: "Money, please!": One other kind of interaction between streamers and viewers is also worth mentioning, though relatively few participants reported it. Some streamers frequently encouraged viewers to tip them when they were performing, but this strategy proved to be a double-edged sword. While 11 participants reported that they tipped specifically because they were asked ("*The streamer was asking everyone to tip her, [so] I thought I should at least tip some money*": ID=158, F), several participants stated that if a streamer repeatedly asked for tips, it deterred them from tipping. "*I think the streamers don't deserve my money. Especially those who directly ask for tips. I do not like it.*" (ID=198, F)

4.3.3 "Do it for me": Real-time interaction is one of the major drivers of live-streaming viewing. Similarly, interaction is a key motivation for tipping. As part of the live-streaming culture, streamers will often do what a tipper suggests doing, provided that the tip is large enough. For instance, some streamers allow viewers to pick songs for them to sing, if the tip is above a certain threshold. Streamers who agree to viewers' requests may increase their chances of receiving tips after the fact:

"I tipped the streamer because the streamer sang a song that I asked for. It was very impressive." (ID=548, F)

4.3.4 "Interaction Among Streamers": Another form of interaction based on gifting function is live-streaming battles. Live-streaming platforms would routinely hold competitions among their streamers, where streamers win by receiving the highest amount of aggregate digital gifts in a given time period. The competition could happen in two forms: 1) A longer time span last from days to weeks 2) A shorter period of time which involves multiple streamers embedded in the same screen. The streamers who won the competition could obtain some rewards from the platform. For example, they would be featured on the main page of live streaming platform, or have their name announced all over the platform.

The nature of competition would engage viewers because streamers would encourage their viewers to tip more, and viewers may feel the value of their giving is amplified. For instance, streamers would tell viewers to "save them from losing", which gives viewers power to vote/support their preferred streamers by using money.

"I don't normally send expensive gifts because I don't feel like spending too much on live streams. However if the streamers that I rooted for is competing in a competition, I would try to send them some gift that's more expensive." (ID=46, M)

4.4 Virtual Gift Design

The digital gifting function offers viewers many options of gifts to tip streamers. The novel design of digital gifts could further extend interaction dynamics between viewers and streamers. In this section, we discuss the design of these gifts and how they generate interactions which aligns to the context of live stream.

4.4.1 Physical Appearance. The digital gifts provided by live-streaming platforms often have their own distinct physical appearances. It could be a lucky star, a kiss, a golden microphone, sports car, and diamonds. Each gift has a different price which sort of reflecting the price in the real world. For instance, a bunch of flowers is worth 0.5 USD and a sport car is worth 100 USD in Momo live-streaming platform. Although the prices of some digital gifts are extremely expensive, there are still a few tippers who are willing to spend large amount of money for gifts, and perceive it as a valuable gift to convey their deep respect or love to the streamer.

"I sent the streamer a gift which worth 1000 dollar. It's a sport car (digital gift). I do appreciate this way of expressing my love." (ID=96, F)

Other viewers perceive the appearance of gifts as a way to represent their attitude or style regardless of the price. Sending these gifts to streamers creates meaning to their interaction with the streamers.

"I once sent the streamer a digital watch as gift because I think it's elegant. I feel like those who send the digital car gifts are cheesy." (ID=553, F)

4.4.2 Theme-related Gift. The various designs of digital gifts allow viewers to interact with streamers according to the context of the performance. For instance, when a streamer is singing, viewers can tip golden microphones and plaudit to compliment the streamer's performance. These digital gifts fit the context of the show, which makes viewers more engaging in the ambience. One of the participants told us an interesting example,

"I remember impulsively sending a gift of flower to one streamer because the way she acted reminds me of my first love." (ID=513, M)

4.4.3 Physical Performance. Whenever a gift is sent, a notification pops up in the chatroom for everyone to see. In addition, sending certain gifts, mostly more expensive ones, will trigger a full-screen animation which overlay on the screen of live streaming video and the chatroom temporarily (Figure 3(c)). Some gifts can even trigger animations that apply augmented reality face filters to the streamers, such as having a finger poking the streamers' faces. (Figure 3(b)). Some streamers would play with the animation, which make the tippers feel they have closer interaction with the streamers thus make live streams more entertaining.

The previous examples demonstrate that the design of digital gifts plays an crucial role in live-streaming interaction. Viewers

can interact with streamers by using text messages, but digital gifts give viewers a chance to be involved in a show.

4.4.4 Tipping Norm. Based on our survey data, 81.5% of participants stated that viewing live-streaming was for fun and killing time, and it's not necessary to give gifts. Still, more than 70% of viewers tip on a regular basis. This may imply that internalized tipping norms [3] derived from face-to-face situations extend to tipping behavior in the digital environment, and that viewers might experience feelings of guilt if they fail to conform to these norms. Moreover, as mentioned in previous section, some streamers deliberately urged viewers to tip them; and such behavior might reinforce tipping norms in the live-streaming environment. As one participant said:

"Is there anyone watching live streams without tipping streamers? I think the person who doesn't tip a streamer is odd!" (ID=165, F).

Furthermore, viewers' tipping behavior might be influenced by other viewers. For instance, Viewers would feel obliged to send gift to streamer if everyone else did it. They would also compare the price of their gifts, and send gifts with similar or relatively higher price to align to other viewers.

"I once sent a gift which was 200-300 dollars, because everyone was sending more expensive gifts at that moment, and I do enjoy the content that the streamer was presenting." (ID=117, F)

Aside from conforming to the norms of gift price, viewers would also send gifts based on the custom of each live streams. These custom were created based on the streamers' preference or events happened in previous streaming sessions. Viewers would tip the same gifts in a short period of time as a nod to the community.

5 SUMMARY

Based on the analysis of the survey, we tentatively identified the main motivations for watching live streams and tipping streamers on Chinese live-streaming platforms. In the case of live-streaming tipping, the motivation can be divided into four dimensions (RQ1): 1) Live-streaming Content, 2) Interaction, 3) Learning, and 4) Providing Support. Furthermore, our findings indicate that many viewers may rationally consider their financial situations when tipping streamers. However, viewers in general do tip when they watch live streams instead of being free-riders, and gift-giving deems to become a medium to interact with streamers (RQ2). This result seems to suggest that tipping is becoming a social norm in this virtual environment. Although we believe that the majority of viewers could only spend a small amount of money on tipping streamers, this characteristic may be strong enough to provide sufficient financial incentives to sustain the growing number of streamers to create new contents and engage in dynamic social interactions with viewers.

The popularity and scale of live-streaming tipping in China is unparalleled. Our findings suggest two possible reasons for this. First, the contents and types of Chinese live streaming platforms are considerably more diverse than other countries, especially in the categories of learning and relaxation live streams. It is possible that the norm of tipping contributes to a positive feedback loop that

drives more streamers to create more diverse contents, which in turns draw in more tippers, and so on. For example, when viewers with diverse interests tip because they feel streamers *"have put in a lot of effort"*, they are to a certain extent encouraging the appearance of contents that serve the "long tail" of viewers, which help to diversify the contents of live-streaming. In the U.S., in contrast, live streams are more focused on public events or at relatively small scales [10], and could easily result in a lack of positive reinforcement for promoting content diversity relative to what we observed in Chinese live streams.

Second, we found that emergent forms of social interactions could attract new viewers and keep existing viewers engaged in live streaming. For example, the immediate and social tipper-streamer interactions that utilize various functions of the platform to engage the viewers may explain why live streaming is more prominent in China than in the West. Tipping provides individuals with a range of ways to show off in front of large audiences and obtain social approval. For example, some tippers gave out expensive gifts to ensure that the streamers would notice them and their comments, and the other viewers publicly endorsed these tippers for their behavior. Moreover, the viewers can actually participate to create new live-streaming content like supporting preferred streamers in competitions or forming communities through tipper-streamer interaction. These activities might help viewers find belongingness and engagement in live streams. As this new form of social media evolves, the tipper-streamer interactions appear to become more social and engaging, which in turn enrich the diversity of live-streaming content, viewership, and interaction types.

5.1 Design Implication

Our survey results indicate that viewers may like to tip streamers in order to encourage streamers to create good-quality contents. In addition, the designs of digital gift could be facilitated to create more diverse live-streaming content. For example, designing various types of digital gifts could encourage streamers to create new contents to fit the characteristics of the digital gift (e.g., Figure 3C: microphone for performing singing). However, the tipping function could also distract a streamer's attention on content creation. Streamers might tend to perform the live-streaming contents according to the profitability rather than originality. In order to attract more viewers and make more profit, some streamers might present inappropriate content [25] which has been disclosed in the news. Therefore, it is necessary to improve this tipping mechanism on live-streaming platforms in the future to prevent streamers from performing inappropriate contents.

In this study, we found that interaction is an important factor that motivates our participants to reward streamers, thus, the design of digital gifts could add more features to improve the interaction between viewers and streamers. The present designs of digital gifts are focusing on appearing the monetary value of a gift (e.g., sport car and castle) and interacting with a streamer's appearance (e.g., poke face and add cat ears), whereas it is still possible to integrate more interactive features into the design of digital gifts. For example, integrating a game, such as Whac-A-Mole, into the virtual gift design allows streamers and viewers to compete with each other, and then the streamer can obtain the virtual if he/she win the game.

In addition, applying augmented reality technology to the virtual gifts may be interesting, which could let streamers and viewers interact with the virtual objects. Such virtual gift-based interaction design could enable more interaction between viewers.

Although we found that interaction is an important motivation for the viewers to tip, they reported that streamers directly asking for tip could deter their tipping motivation. The "double-edged sword" strategy of asking viewers for tip bring tension to the relationship between streamers and viewer. To address such issue, live-streaming platforms could consider provide more options for viewers to reward streamers instead of being only driven by monetary incentives.

Live streaming is becoming one of popular social network sites. The findings of this work could contribute to mobile HCI community by uncovering how viewers interact with streamers and exploring the effects of adopting tipping function in live streaming context. We identified major motivations which may drive viewers to tip their preferred streamers, and then we discuss how the designs of virtual gift affect their social interaction. We believe these results could provide some ideas for future researchers and practitioners to improve social interaction on live-streaming platforms.

6 LIMITATION AND FUTURE WORK

First, much live-streaming tipping takes the form of digital gifts, which vary considerably in design from platform to platform. For this reason, it has been difficult to take full account of them in this paper. To help avoid bias, we asked the participants to answer all price-related questions in terms of the currency of their own country; and no participants directly mentioned that their tipping motivation was influenced by gift designs. Nevertheless, based on our video analysis, we believe that gift design may be one of the factors that impacts viewers' tipping behavior, and this possibility should be investigated further.

Second, we collected participants' self-report data to investigate the how digital gifting influenced interaction between streamers and viewers. Although we suggested participants to leave their live-streaming account to verified their information, we were still lack of direct proof to evaluate reliability of their answers.

Third, most of the participants reported tipping between \$5 and \$30 (USD) per week. Based on direct observation, however, quite a few viewers tipped much larger amounts than this in a single live-streaming session. In the absence of any survey data from these generous tippers, whose tipping motivations and behaviors may differ sharply from those of the general population, is therefore another limitation of this work, and an area that should be explored in the future. Likewise, it would be worthwhile to explore streamers' motivations for streaming, and their tip-generating strategies, because live streaming is a two-sided interaction in which each party's actions change the behaviors of the other.

Finally, cultural difference is another important issue that should be explored in future work on this subject. This is potentially a very rich and complex strand of inquiry, due to national differences not only in the uses and popularity of live streams, but in face-to-face tipping culture. In particular, we would like to explore the extent to which live-streaming tipping is an extension of offline tipping norms, vs. a new phenomenon with its own emergent rules.

7 CONCLUSION

This study investigated people's motivations for tipping streamers on Chinese live-streaming platforms, and how live-streaming tipping impacted social interaction among streamers and viewers. We derived four main motivations for tipping from our survey data. Content and interaction appear to play important roles in making live streams engaging, though learning new knowledge and providing support to streamers were also mentioned among viewers' motivations for tipping. We also identified interaction patterns triggered by the design of digital gifting functions. We hope that the new insights our study provides into live-streaming tipping behavior will have important practical implications for future streaming practitioners and technology designers.

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