

# Game or Live Streaming?: Motivation and Social Experience in Live Mobile Quiz Shows

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## ABSTRACT

Live quiz shows that make use of mobile applications embed aspects of both games and live streaming. To understand users' motivations and experiences related to these mobile quiz shows, we used a mixed-methods approach that includes interviews (N = 16) and a survey (N = 296). We conducted a thematic analysis of interviews to identify seven motivations, five of which were verified through a factor analysis of survey data: interactivity, offline integration, achievement, ease of enjoyment, and financial incentives. Moreover, we examined how those motivations influenced users' perceptions of the apps and their in-app behavior patterns. The motivations of offline integration and financial incentives positively affected users' frequency of app usage, their recommendation of the app, and their habitual usage. This result implies that, to drive persistent usage, it is important to foster social integration and to properly balance both the average chance of winning and the amount of distributed prize money. Furthermore, our results suggest new directions for using design implications to improve user engagement.

## CCS Concepts

•Human-centered computing → User studies; Hypertext / hypermedia; Smartphones;

## Author Keywords

Motivation; live streaming; mobile quiz show; game design; video design; user experience.

## INTRODUCTION

Live quiz show mobile apps such as HQ Trivia and FN Genius are gaining attention across the country. These mobile quiz show apps follow a familiar format in which a host presents quizzes at appointed times each day, and the users then answer the quiz questions in real time. All users who correctly answer all the questions share the prize money. In other words, when there are fewer winners, each winner gets more money. HQ

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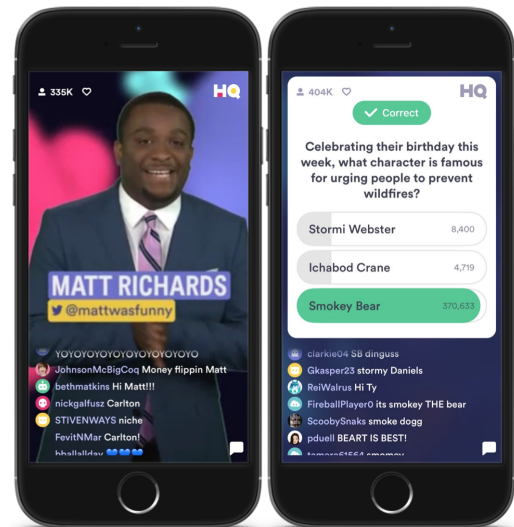


Figure 1. Example of representative live mobile quiz show, HQ Trivia. Mobile quiz show takes both features of live streaming and mobile gaming.

Trivia was released in the United States last year and has more than 2.1 million concurrent users, and it is now expanding into various countries [1]. In addition, the Chinese quiz show “Baiwan Yingjia,” or “Millions Winner” has reached 6 million users and offers prize money of about \$450,000 [20].

The mobile quiz show is a new type of entertainment that combines a mobile game with live streaming. It contains game-related features such as survival and competition [29]. A host typically asks around 12 questions, each of which have three answer choices; the questions progress in an increasing level of difficulty. The users who select the right answer within 10 seconds move on to the next level; the rest do not. Users have to survive until the last stage of the quiz to receive prize money. Moreover, when users defeat more competitors, they earn more prize money. This new form of entertainment also shares characteristics with live streaming. The hosts are entertaining as they rattle off multiple questions in real time, comment on the correct answers, make jokes, and read live text from the chats at the bottom of the screen. The users who view these live quiz shows feel like they are participating in

live streaming by interacting with the hosts and other users [19, 27, 14].

Therefore, mobile quiz shows are relevant content for the HCI community, as they involve aspects of both mobile gaming and live streaming. Combining these aspects into a new form of entertainment generates a novel playing experience. Even though all the users of a given app receive the same content, they have differing behavior patterns and various motivations for using the app [13, 21]. To understand this new socio-technical phenomenon, we conducted a mixed-methods user study that employed both interviews ( $N = 16$ ) and a survey ( $N = 296$ ) to explore users' experiences and motivations related to the use of mobile quiz show applications. Specifically, we identified the motivations for using mobile quiz show applications. We also investigated how these motivations are related to the ways in which users perceive the application as a game or as live streaming. Furthermore, we examined users' play patterns and in-application behaviors in relation to their motivations. The results demonstrate that users' needs, social aspects, and playing behaviors should be considered when designing a live mobile quiz show, which is a new entertainment format.

By understanding players' experience and motivations, we can provide design guidelines to encourage and sustain user participation [23]. Our contributions include the following:

- Identifying how users experience the new type of entertainment and what motivates them to engage in it, reflecting both the aspects of the game and live streaming, as well as the application's distinct characteristics: 1) interactivity, 2) offline integration, 3) achievement, 4) ease of enjoyment, and 5) financial incentive.
- Identifying users' perception of the application as a game or as live streaming that resulted from playing motivations evolving over time. Each perception suggests a different focus on the design elements, including attracting initial users with game-related elements and retaining experienced users with streaming-related elements.
- Providing design implications derived from users' motivations and play behaviors, including fostering offline integration and balancing the chance of winning to drive persistent usage.

## RELATED WORK

Uses and gratification theory is a framework to explore users' motivations in certain media usage and explains how those needs are satisfied [21]. The theory assumes 'active users' and focuses on their social and psychological needs [13]. Applying the uses and gratification approach, we can assume that users utilize mobile quiz show to gratify particular motives. Since the mobile quiz show has both game and live streaming characteristics, we need to review previous research on motivations of using game and live stream.

### Motivations for Playing Game

A wealth of research has covered game-playing motivations, and the traditional model used is Yee's online gaming motivation

scale [29], which is based on a three-factor model that empirically tested Bartle's MMORPG player classification [3]. Yee et al. [29] collected motives from more than 3,000 players and classified them into three categories: achievement, social, and immersion. Similarly, these three categories were used in the study done by Williams et al. [27]. Furthermore, Yee et al. [30] developed an online gaming motivations scale based on the 3-factor model and confirmed that this scale is applied in different cultures. In addition, they verified how the in-game behavior is related to each motivation based on user data.

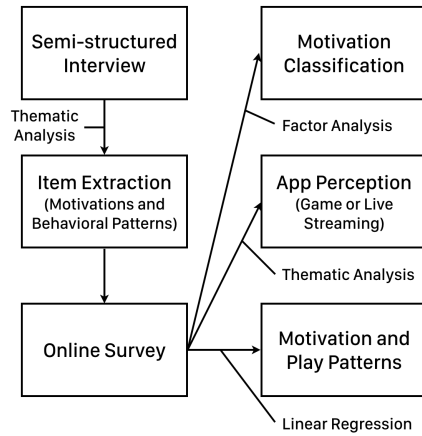
In addition to Yee's three-factor motivation model, other approaches have been used to classify game-playing motivations. Sherry et al. [22] proposed six reasons for video-game use, which were based on the use and gratification theory; these reasons were competition, challenge, social interaction, diversion, fantasy, and arousal. Furthermore, Lafrenière et al. [16] tried to define a motivation classification for general game use. On the basis of the self-determination theory, they provided the following categories: intrinsic motivation; integrated, identified, introjected, and external regulation; and amotivation.

Most studies on game-playing motivation have focused on the MMORPG genre; relatively few studies have been conducted on other game genres [9]. Because characteristics of games vary depending on the genre, it is necessary to establish game-motivation items in relation to each game genre or each group of characteristics. Ghuman et al. [9] applied the motivation-classification items of Yee et al. [29] and demonstrated that game-playing motivation differs depending on the game genres. In another study, all types of game genres were investigated using the motivation classification items of Yee, and the achievement and social factors were bundled together [15]. Furthermore, the motive of socializing has been characterized for seniors who play game-related contents [2]. Thus, to measure the motivation items of the trivia genre in a live-stream setting, it is necessary to determine motivation items pertinent to quiz games.

Unlike existing online games, mobile trivia games are highly accessible but enjoyable for only a short period of time. Moreover, users can acquire real-world common sense by answering the questions. The recent mobile quiz show offers prize money, so the challenge of winning money also functions as an important motivating role. In general, these various characteristics differentiate mobile quiz shows from existing games; however, the pertinent motivation items have not been studied yet for mobile quiz shows. Thus, the current study will develop motivation items that reflect the characteristics of this type of game and investigate how these motivation items affect actual behavioral patterns.

### Motivations for Viewing Live Streams

In order to understand the motivations of using the mobile quiz show, we also reviewed the studies on the motivations and user behaviors of using live streaming. The mobile quiz show is operated with a video streaming technology and contains characteristics of the live streaming. For instance, a host performs the show at the appointed time and users watch and participate in the show. This content format can be interpreted as the existing live streaming, which has been used in areas of



**Figure 2. Procedure of the method used in the current study.** Responses from the semi-structured interviews were used for the in-depth understanding of how users perceive and play the live mobile quiz show apps.

game watching [12, 10, 24], live event viewing [11], learning and creative work [7, 18, 17], and shopping [5], has evolved as a way to induce more active user participation. Research on the motivation for using live streaming was mainly conducted from the viewer or user aspect and also from the streamer aspect [25, 8]. Since the current study investigates motivations of using mobile quiz show, we will review studies focusing on users' motivations and behaviors.

Recent developments in the field of live streaming have led to a renewed interest in game watching on Twitch. Hamilton, Garretson, and Kerne [12] found that content characteristics and participatory experiences drive viewers' engagement. Based on the uses and gratification theory, Gros et al. [10] categorized the motivation and behavior of Twitch users into three types: information, entertainment, and socialization. In other study, viewers' motivations were classified as cognitive, affective, personal integrative, social integrative, and tension release motivation [24]. Those studies based on uses and gratification theory have succeeded in categorizing user motivations, yet may have not found unprecedented user experience because they applied predefined questionnaires. Since mobile quiz show has more proactive aspect compared to the existing live streaming by inducing actual user participation, new motives and behavioral patterns that were not discovered in previous live streaming users can be revealed. Therefore, this study primarily detects diverse motivations based on in-depth interview, rather than using predefined questionnaires.

Live streaming, which was mainly concentrated on video game, is currently being expanded to include various topics such as lifestreaming, performance, and knowledge sharing [19]. In accordance with this trend, research on user motivation and engagement has been conducted on various contents besides games. Haimson and Tang [11] found four dimensions that make remote event viewing engaging with Facebook Live, Periscope, and Snapchat which are immersion, immediacy, interaction, and sociality. The study about live streaming shopping experience classified motivation as hedonic and utilitarian

[5]. Moreover, they found reasons for preferring shopping via live streaming compared to via online shopping which could be a differentiated motivations of live streaming shopping usage such as retaining product demos and interaction. Lu et al [19] focused on general live streaming experience and identified elements of an engagement in stream as content and form, aesthetics, communication with others, and emotional reactions.

Diverse motivations associated with the live streaming have been discovered in previous studies. Interaction and sociality, which were commonly found in the research, can also be identified in mobile quiz show. However, the specific manifestation or behavioral pattern associated with those motivations may appear differently. We examines how those motivations are emerged and what noble motivations may be discovered when using mobile quiz show.

## METHOD

We conducted a mixed method study with an initial interview phase (N = 16) followed by a survey phase (N = 296) to understand motivations and behavioral patterns of using mobile quiz show. In the first phase, we conducted in-depth semi-structured interviews to investigate users' patterns of motivations and behaviors in using mobile quiz show. We did not utilize pre-defined survey questionnaires since mobile quiz show is a new entertainment format, which includes the features of mobile game and live streaming. By focusing on the respondents' own explanations, it is possible to capture insightful findings about emerging phenomena. Based on the in-depth interview, we elicit major motivations and behavior patterns with a thematic analysis. We identified seven motivations and 13 behavioral patterns.

In the second phase, we surveyed regular mobile quiz show players about motivations and behavior patterns. The questionnaires were based on the analysis of our interview. Based on survey results, factor analysis was used to create a typology of motivations. We also conducted a linear regression to explore how the motivations affect users' behavioral patterns. We also collected open-ended survey responses about the app genre perception (as a game, or live streaming).

### Data Collection: Interview

The semi-structured interviews were mainly focused on participants' motivations and behavioral patterns in using live mobile quiz show application. The interview questions included 1) the basic demographic data, 2) specific quiz show application in the current use, 3) the first opportunity to use and duration of usage, 4) motivations for participation, 5) behavior patterns of usage (in-app and offline), 6) positive and negative experiences, 7) the perception for the category of the app (game, live streaming, or others). In addition to the questions mentioned above, several follow-up questions were also asked for users to elaborate on their thoughts, experiences, and behaviors.

We interviewed 16 users (9 male and 7 female) to explore their motivations and experiences of using mobile quiz show. A demographically representative set of participants was sought and the target age was divided into four categories (20s and under, 30s, 40s, and 50s and over). We also considered the

occupations of participants. All of the participants were active users of live quiz show applications (HQ Trivia, Cash Show, FN Genius, Jam Live, PAYQ, Baiwan Yingxiong). The interview was expected to take approximately 45 minutes. Participants were recruited through Facebook posts, Twitter posts, and posts to Reddit subreddits of HQ Trivia. After receiving 35 applications, we selected participants based on the criteria of using the live mobile quiz show application at least twice a week for at least one month to extract “active users.” Participants were each compensated for their time with \$20. We interviewed participants at a public place they chose. For the participants who were unable to meet offline, the interviews were conducted over Skype call. All of the interviews were digitally recorded, which allowed for the responses to be transcribed verbatim. Based on the interview responses, the motivations and behavioral patterns of using the mobile quiz show were analyzed.

### Data Analysis: Interview

Thematic analysis [4] is a qualitative research method that enables us to discover and analyze patterns or themes in data. The purpose of our study was to configure new motivations by using empirical data. Therefore, we performed a thematic analysis based on the bottom-up approach. Three researchers read 16 interview scripts from the recorded audio materials (Step 1: Familiarization with the data). Then, we repeatedly read the recorded data to identify meaningful statements that indicate the motivations of usage and behavioral pattern (Step 2: Generation of initial code). This process was repeated five times until the identified themes were saturated (Step 3: Searching for and reviewing themes). Finally, the themes were defined from the clustered keywords (Step 4: Defining and naming themes). Each keyword was grouped with a shared labeling as shown in Table 1. We performed a thematic analysis at the latent level in order to understand and theorize the underlying structures of usage behavior.

### Data Collection: Survey

Based on the themes related with usage motivation and behavioral patterns that emerged in the interview data analysis, we created survey questionnaires. The purpose of the survey is to generalize the findings to a larger population, to statistically categorize usage motivations, and to understand the effects of motivations on app perception and usage behaviors. Total of 25 items were used in the survey to evaluate the degree of respondents motivations (‘specific motivations’ in Table 1). All items were scored using 5 Likert scale. Similarly, regarding behavioral pattern, total of 13 items were asked using 5 Likert scale. Specific original items are as follows: participation patterns (frequency of using the app, habitually participating mobile quiz show, higher the prize money and higher the possibility to participate, participate regardless of prize money), social behavioral patterns (prefer to play alone, prefer to play with others, recommend others to play together, share or to share the app related status with SNS or messenger), and playing patterns (use strategy to win the prize, enjoy the chatting, continue to participate even after being eliminated, turn on the sound to enjoy an app, turn off the sound to enjoy an app). The results that are worth interpretation are shown in Table 3.

Theme	Specific Motivation
<i>Easiness</i>	Because the app is simple Because it is easy to participate and play Because it takes a short time to participate Because the rule is simple
<i>Incentive</i>	To win a prize money For an expectation to win a prize money To get an extra life
<i>Achievement</i>	To feel a sense of accomplishment Because of a confidence of being better than others To win and brag To compete with other users To reach higher stage of quiz
<i>Knowledge</i>	To accumulate and acquire knowledge To test my knowledge
<i>Enjoyment</i>	Because the app itself is enjoyable To take a break and to kill time To enjoy solving a quiz To enjoy participating a quiz show To enjoy viewing a live streaming Because the performance of MC is entertaining
<i>Offline Integration</i>	To have fun with friends, family, and so forth To join common activity in peer group To Enhance connections with family and friends
<i>Interactivity</i>	To interact with other users in a chatting room Because typing in and viewing a chatting is fun Because interacting with the host is fun Because it is fun to play with other users

**Table 1. Result of thematic analysis of motivations.**

We recruited 443 participants from Amazon Mechanical Turk, comprising a US panel since survey questionnaires were written in English ( $M_{age} = 30.32$ ,  $SD_{age} = 9.32$ ; 43.2% women). To filter out unqualified responses, we omitted 147 participants’ response data for incorrectly answering filtering questions, such as “Please enter the name of mobile quiz show app you are using” and “How many levels does the quiz show which you play consist of?” We excluded responses from 124 participants who incorrectly answers for those questions. We also excluded 38 participants whose median response time was less than 120 seconds and participants with uniform responses. We finally obtained 296 valid responses. The respondents had a mean age of 31.1 years ( $SD = 8.40$ ; 136 female, 160 male).

### Data Analysis: Survey

#### Factor Analysis of Motivations

Based on survey results, we conducted an exploratory factor analysis to organize items about motivation according to dimensions. Principal component extraction was used for the factor analysis. Varimax rotation has applied in the analysis process, rather than target rotation to run the linear regression for examining the effects of motivation on behavioral patterns [19]. A total of 294 responses among 296 valid responses were used for the statistical analyses. Data for two participants

Factor	Items	1	2	3	4	5
<i>Interactivity</i>	Because participating and viewing the chatting with other players is fun	<b>0.885</b>	0.171	0.132	-0.011	0.047
	To interact with other players in a chatting room	<b>0.869</b>	0.202	0.123	-0.082	0.055
	Because interacting with the host is fun	<b>0.832</b>	0.215	0.111	0.095	0.051
	Because it is fun to play with other users	<b>0.638</b>	0.214	0.415	0.146	0.042
<i>Offline Integration</i>	To Enhance connections with family and friends by sharing play experiences	0.260	<b>0.836</b>	0.179	0.055	-0.078
	To have fun with friends, family, and so forth	0.212	<b>0.794</b>	0.196	0.222	-0.066
	To join common activity in peer group	0.350	<b>0.771</b>	0.191	0.093	-0.095
<i>Achievement</i>	To win and brag	0.094	0.229	<b>0.821</b>	-0.057	0.049
	To compete with other users	0.243	0.023	<b>0.786</b>	0.176	-0.018
	Because of a confidence of being better than others	0.152	0.233	<b>0.775</b>	-0.038	0.193
<i>Ease of Enjoyment</i>	Because the rule is simple	0.039	0.013	-0.041	<b>0.821</b>	0.117
	Because it is easy to participate and play	-0.060	0.049	0.131	<b>0.777</b>	0.185
	To enjoy solving a quiz	0.056	0.249	-0.012	<b>0.612</b>	0.029
<i>Financial Incentive</i>	For an expectation to win a prize money	0.123	-0.100	0.206	0.075	<b>0.784</b>
	To win a prize money	0.049	-0.102	-0.001	0.298	<b>0.777</b>
<i>Total Variance Explained (%)</i>		19.09	14.88	14.79	12.55	9.14

**Table 2. Factor analysis result for the motivation of using live mobile quiz show**

were excluded in the main analysis because of a number of missing values.

#### *Effect of Motivation on App Perception*

We analyzed open-ended responses from an online survey of the reason of recognizing the mobile quiz show as game or live video. Similar with the interview data analysis, the analysis of the data was performed using thematic analysis based on the bottom-up approach. The open-ended answers were coded by three researchers iteratively. The relevant codes were transcribed and transferred to sticky notes and similar codes were merged together. The codes were then organized under main themes from which we derived the implications.

#### *Effect of Motivation on Behavioral Pattern*

We examined how the motivations are related with specific behavioral patterns. We extracted 13 behavioral patterns of mobile quiz show usage from the interviews. We conducted a multiple linear regression to see how motivational factor groups affect users' behaviors. The goal of our study was not to see the interaction of behavior as a dependent variable, but to determine the effect of motivation on each behavior patterns. Therefore, instead of grouping the dependent variables using an analytical method such as multivariate analysis of variance, we did an individual regression analysis for each behavior factor.

## **RESULTS**

### **Usage Motivation**

After extracting keywords from the interviews, we identified seven main categories of motivations for using mobile quiz shows, as shown in Table 1: 1) easiness, 2) incentive, 3) achievement, 4) knowledge, 5) enjoyment, 6) off-line integration, and 7) interactivity. We then grouped these classifications into various subcategories.

Motivations were also tested by factor analysis using survey data. First factor analysis was conducted with 27 items. The Bartlett test result showed that the correlation between variables is significant (chi-square: 3782.377,  $p < 0.001$ ,  $df=406$ ). The results of the KMO test were 0.848 and verified the validity of using factor analysis by exceeding 0.6. As a result of the preliminary analysis, the 27 items clustered into seven factors by satisfying the eigenvalue of the Kasier standard and the scree plot result.

After extracting factors, the communalities for each of 27 variable were examined. Communality indicates the amount of variance in each variable that is accounted for and should be met by a minimum of 0.6. It has shown that 14 variables were proved as less than 0.6. Factor analysis was carried out again except those 14 variables with the same procedure. As a result of the final model, the 15 items were clustered into five factors (Table 2). The result of KMO ( $KMO=0.808$ ) and Bartlett's test (chi-square: 2127.399,  $p < 0.001$ ,  $df=120$ ) shows that 15 variables are appropriate for further factor analysis. Our final model could explain 70.45% of the variance with five factors which satisfy the eigenvalue of the Kasier standard and the scree plot result. Varimax rotation method has applied in the analysis process, and factor loading after rotation was shown in Table 2.

Five out of the seven themes were identified through factor analysis (Table 2). The motivations which were often mentioned in the interview, such as knowledge acquisition or killing time, were eliminated in the factor analysis. We will further explain each motivation derived from statistical analysis based on interview and survey results.

#### *Interactivity*

The first motivation of using mobile quiz is composed of 4 items which are related to interaction within the application (Table 2). Therefore, the first factor is designated as *interac-*

tivity. The first factor accounts for 19.1% of the total variance, and the Cronbach  $\alpha$  is 0.89.

A number of participants enjoyed participating and viewing the chatting which are common behaviors in live streaming [11, 19, 12, 10]. They mentioned that: *"I do enjoy interacting with people from all over the world in the chatroom"* (P3) and *"I enjoy seeing others' opinions in the chat and some of the wild comments thrown out there"* (P9). Some users mentioned playful chatting and the hosts' performance together, implying that those aspects are closely related. The users enjoy the hosts' live responses to comments in the chats, which may reinforce perceptions regarding the apps' real-time characteristics. For example, P4 noted that *"The hosts are funny and respond to funny comments. I also like that everything is live."*

Although we removed the host's performance from the motivation factor in the statistical factor analysis, the users often mentioned their enjoyment of the hosts' performance in the interviews: *"I also find the hosts Scott and Matt entertaining. I like it because it's upbeat. Their slang usage and name-drops are also on point"* (P10). This factor is not directly related to interactivity, but it may enhance interactivity-related experiences.

In addition to the chat experience and the interactions with hosts, users often cited the pleasure of playing with other users in real time as a motivation for interactivity. This is consistent with the result that users placed major value on the participatory experiences of community socialization and interaction in the game streaming context [12]. As noted by P13, *"I love playing with millions of people in a friendly game where you can also possibly win money."* Similarly, P11 also mentioned that *"I enjoy being part of the community."*

#### Offline Integration

The second motivation is composed of 3 items regarding offline integration (Table 2). Offline integration refers to the motivation of enhancing connections with family, friends, and so forth [24]. This factor accounts for 14.9% of the total variance, and the Cronbach  $\alpha$  is 0.89. It should be noted that this motivation is related to offline sociality. Scholars have not discussed the motivations for offline social integration related to games in much detail, but they have identified offline-based sociality as a motivation for live streaming [11, 24].

Users not only enjoyed playing the quiz show, but also **playing together** with their friends, family, and coworkers. They used it as a means of social activity, as noted by P2, *"I enjoy HQ trivia because I play with my coworker and family and we have fun interacting and surviving through the rounds,"* and P5, *"I highly enjoy mobile quiz shows because they give me a chance to connect with my friends and family. We like to play together and laugh at the silly questions that show up sometimes."* It also helps enhance social relationships with family or friends. P10 noted that *"I usually play with my dad, and it's a nice bonding activity for the both of us."*

When the users play the app with their friends and family, cooperation and competition happened at the same time. P4 mentioned that *"My wife and I usually compete to see who can do better. The chance of getting real money is a bonus!"*

Along with a competition, users strategically worked together to move on to the higher level. Regarding the specific strategy, they shared their answer and one of the members sometime searched for answers online according to P2. When all members did not know the answers, they separately chose different three choices to increase the odds of winning.

Furthermore, mobile quiz shows provide opportunities for accidental social gatherings. For instance, researchers have found that users formulate impromptu, short-term communities by using live streaming [11, 12, 25]. Similarly, P16 mentioned that *"Even though I usually play alone, there are times when I happen to play with other people around like friends during a night out or just hanging out in one of our apartments so it creates this spontaneous group game of funny banter and competition."* This implies that mobile quiz shows are not limited to online entertainment content, as they can also support communities that are dispersed but have shared interests.

#### Achievement

The third motivation is composed of 3 items for the achievement (Table 2). This factor accounts for 14.8% of the total variance, and the Cronbach  $\alpha$  is 0.80. From the original survey items derived from the interview, the item of 'to feel a sense of accomplishment' and 'to reach higher stage of quiz' were omitted in the factor analysis process. More extrinsic and social values such as 'to win and brag,' 'to compete with other users,' and 'a confidence of being better than others' were remained as achievement motivations.

**Bragging rights** emerged as a major aspect of achievement; this feature has not been found in previous studies of game users' motives. Achievement motivations include advancement (e.g., leveling up and becoming more powerful), figuring out the game's mechanics, and competing with other players [29, 30, 27]. The fact that bragging mostly targets users' friends and acquaintances explains why it was not present in previous game-related studies. P7 noted that *"Because so many people play now, the prize money really isn't great, but I try to win just for the bragging rights,"* and P14 also note, *"I enjoy telling people I have won the game 4 times."* P15 also enjoyed the bragging moment when achieving a higher level: *"It's so much fun to brag to my friends when I make it to a higher level than they did. Often, me and my friends text each other right before a game is going to start."* As seen bragging rights are accompanied by confidence (i.e., that one is better than others) and mostly target offline relationships. However, bragging rights are more explicit than a sense of intrinsic accomplishment, which helps distinguish between the motivations of game and mobile quiz-show users. Therefore, the achievements that users experience in mobile quiz shows are more extrinsic and social than the motivations that users experience in traditional games.

Competition appeared as an achievement motivation as it did in game motivation. Users enjoyed competing with other participants in terms of survival. P15 mentioned that *"I enjoy the mobile quiz show HQ Trivia because of the competition aspect. I enjoy seeing if I can beat other participants in order to get the correct answers."* Also, P2 said that *"First and*

foremost I enjoy being competitive and jumping into a game where thousands of people are just as eager and revved up to answer questions.” Moreover, displaying the dropout in real time heightens the experience of competition as noted by P14: “I enjoy that it is a live format so we can watch the number of people go down as the game goes on.” Competition occurs not only in online but also in off-line, which drives user to keep being challenged. For example, P2 noted that “My motivation is usually to do better than my friends and co-workers.”

Even though the intrinsic motivation of achievement appeared in the thematic analysis, this motive was not emerged as a significant variable in the statistic analysis. To accomplish a higher level is the representative value related with intrinsic motivations derived from the interview: “I’m motivated to show my knowledge and to do well and get a higher score today than the last time I played” (P6), and “I like the challenge of trying to beat my previous score” (P13). Although a leveling is the representative achievement motivation in game [29, 22, 27, 30], this was not significantly regarded as the motivation of using mobile quiz show, reflecting different aspects of traditional game and mobile quiz show.

#### *Ease of enjoyment*

The fourth motivation is composed of 3 items that are related with easiness and enjoyment (Table 2). Along with the items of simple rule and easiness to participate, enjoyment of solving the quiz, which was originally categorized as an enjoyment in the thematic analysis included in this factor. Therefore, we named this factor as an ease of enjoyment, reflecting both aspects of ease and enjoyment. This factor explains 12.6% of the total variance, and the Cronbach  $\alpha$  is 0.64.

Ease of enjoyment has not been identified as a factor in previous studies of both live-streaming and game-related motivations. However, the convenience aspect of live streaming (i.e., that it can be initiated with little effort) has been mentioned as one of its advantages [25]. Indeed, ease of enjoyment is related to the concept of ease of use—the degree to which a user believes that the use will be free of effort—from the technology acceptance model [6, 26]. This value emerged as a prominent motivation in users’ enjoyment of mobile quiz shows, thus reflecting a unique characteristics of these shows’ content [26]. Moreover, the enjoyment of answering quiz questions is related to perceived enjoyment (i.e., the intrinsic perception of enjoyment in its own right). Because the users categorized their enjoyment using the ease-of-enjoyment item, one of the main factors in their enjoyment is likely the quiz show’s simple format and rules.

Indeed, participants compliment the quiz show for its simple format with easy rules, as noted by P10, “The format is also easy to learn and adapt to,” and by P15, “I like to participate in such apps because its fun, interface is super easy to use and to explain to any friends or family.” Other participants appreciated the promptitude of the content. For example, P2 mentioned that “It’s a very fun use of time and in the end it’s only 15 minutes which I really appreciate,” and P9 said that “I enjoy how quick and easy it is to play. The ten to twelve question format goes very quickly.” Moreover, the hosts’ emceeing boosts the speediness of the game as mentioned by

P3, “The HQ hosts are great too, because they are entertaining but don’t talk too much or take too much time. It is a quick game, quick fun!”

The attribute that the app operates on mobile device and users could easily connect with no space constraints also contributes to ease of use. No complicated equipment or high-quality specifications of network is required. P13 noted, “I also enjoy the comfort of playing from your phone by simply clicking the app and you’re set!” On the other hand, this result also implies that the connectivity issue may importantly affect user engagement as P16 mentioned, “I enjoy it for the potential to win prize money from a mobile platform that does not waste my time or does not have connectivity issues.”

Several interviewees compared mobile quiz shows to TV quiz shows and trivia nights. They said that the apps made it possible to enjoy quiz activities while conveniently remaining at home: “I love trivia, and often go to trivia nights at local establishments in my area. HQ Trivia allows me to have a similar experience from the comfort of my own home, while still offering the opportunity to win money” (P6). Mobile quiz shows also enable users to engage in **TV-like entertainment** as part of a true live experience, as P16 noted, “I’ll never get into Jeopardy! and I love quiz shows so this is the next best thing.” Overall, P8 appreciated the new entertainment format of traditional TV entertainment and mobile gaming: “HQ combines some of the winning formulas of traditional TV quiz shows with an energetic host and live programming at the same time every day with the fast-paced interaction of a video game. Every player becomes a contestant and we compete for a cash prize, and it is free to enter.”

#### *Financial Incentive*

The last motivation of using the mobile quiz show is composed of 2 items which are ‘for an expectation to win a prize money’ and ‘to win a prize money.’ We designated the factor as a financial incentive. This factor accounts for 9.1% of the total variance, and the Cronbach  $\alpha$  is 0.68.

The mobile quiz apps’ characteristic of providing a **continual chance of winning a prize** motivated users to use the app steadily. P14 note that “Because the possibly always exists for me to win money.” Even when they did not actually win, some enjoyed the expectation of winning, as noted by P6, “I also like the thrill of maybe winning big money and frequently imagine what I would do if I won all that money.” and by P1, “I like participating in it because even though I never do, I feel like each game is a new chance to earn money.”

Despite the time and effort involved, the ability to easily envision making money encourages users to participate the quiz show consistently. P7 mentioned that “I enjoy the quiz show as a means to potentially win a sizable amount of money for very little actual work.” P5 thought that he takes advantage of his leisure time: “It is worth to play because it promotes the possibility of earning money in my free time.”

The amount of prize money also influenced the degree of motivation to participate. Some interviewees participated regardless the prize money. On the other hand, some said that larger prizes increased their motivation to participate: “One



*big element that motivates me to play is the fact that money is the prize money. Sometimes they offer a really high amount of money which makes me want to play even more” (P8).*

### App Perception : Game or Live Streaming?

Mobile quiz show could be categorized either as game or live streaming. Depending on the countries, quiz show applications are classified as game or entertainment in the app store. To understand users’ perceptions of the app, we asked them whether they perceived the app as a game or as a live streaming, along with an open-ended question asking the reason.

#### Live Mobile Quiz Show as a Game

In the binary questionnaire of asking whether users think the application as a game or as a live streaming, 47.8% of users perceive the app as a **game**. First, **competition** was emerged as the major value for considering the mobile quiz show as a game (58 mentions). Respondents mentioned “*form of a survival*,” “*goal to win*,” “*a winner and a loser*,” “*winning and losing*” and “*a criteria for success and failure*” as related characteristics. Second, a **prize money** makes users to perceive the mobile quiz show as a game (41 mentions). The element of “*chance of winning a prize*” was an important game experience. This is closely related to competition, but a bit different in that the purpose of winning is focused on achieving the prize money, rather than surviving among other users. Finally, **active participation** was another theme in which users perceived the mobile quiz show as a game (19 mentions). One respondent mentioned that “*Because you actively participate in what’s happening. You are not just watching and chatting.*” Stop playing the after the elimination also allowed the quiz show to be recognized closer to the game.

#### Live Mobile Quiz Show as a Live Streaming

52.2% of the respondents perceive the app as a **live streaming**. First, **live format** based on streaming technology encouraged users to perceive the mobile quiz show more close to live streaming (78 mentions). The characteristics of “*live*” and “*real time*” were mentioned in nearly half of the responses which choose the app as a live streaming. Also, the problem of disconnection issue was also mentioned: “*I think it’s more live streaming because it has the same issues that live streaming has. There is a delay whenever I play, which causes some issues with the timing of the questions.*” Second, the app’s **regular schedule** was emerged as a value for live streaming perception (43 mentions). This appointment gaming characteristics makes users perceive the app closer to live streaming. Respondents mentioned the words such as “*a certain time*,” “*at a set time*,” “*two times a day*,” and “*the regular show times.*” Finally, users perceive the app as a live streaming for the **interactions** occurring in the app (20 mentions). The interaction between the host and the users highlights the live features. Also, it has revealed that the host’s “*countdown*” and “*shout-outs*” heighten the interactivity feature.

#### Changes in App Perception through Usage

Users perceived the mobile quiz show app as a game or as a live streaming. Moreover, it was found that the main motivation alters with the users’ app usage experience, and the perception of the app genre also changed accordingly based

on the interview analysis. In the initial stages of the app usage, financial motivation was principally activate, thus users were more likely to perceive the mobile quiz show as the game. However, as the experience of the app usage accumulated, users play the mobile quiz show as if they actively watched the live streaming. This change in behavior pattern allowed the mobile quiz show to be recognized more close to live streaming.

### Effects of Motivations on Usage Behavior

Table 3 shows the results from multiple regression models of motivation and behavioral patterns. Motivations of off-line integration and financial incentive triggered more frequent usage and habitual play. Players with high social integrative and ease of enjoyment motivations tend to show higher participation rate, when the prize money is large. On the other hand, users with high financial incentive motivations were likely to participate regardless prize money.

Regarding social behavioral patterns, social integrative motivation had a significant effect on playing together, recommending to others to play together, and share the app-related contents on SNS. Moreover, financial incentive motive was positively related with a app recommendation and motives of interactivity and achievement have shown positive relation with sharing on SNS.

Behaviors related with playing pattern were generally highly correlated with motivations of interactivity and social integrative. Interactivity motivation has driven behaviors of enjoying the chatting, playing with sound-on, and continuing after elimination. Similarly, users with high social integrative motivation tend to play the app with sound-on and continue playing after elimination. However, the off-line sociality motivation showed positive relationship with using strategy and was unrelated to enjoy chatting unlike motivation of interactivity.

## DISCUSSION AND DESIGN IMPLICATIONS

### Game or Live Streaming?

Regarding the motivations for mobile quiz-show use, we found that game and live-streaming motivations simultaneously existed. We also discovered motives that reflect the characteristics of the mobile quiz shows’ content. In particular, we identified five motivations: interactivity, off-line integration, achievement, ease of enjoyment, and financial incentive.

Achievement, interactivity, and offline integration are typical motivations for game users. However, specific aspects of how these motivations manifested in mobile quiz apps and in games were slightly different. For achievement, specific motivations such as advancement, analysis of game mechanics, and competition are joined by concrete factors such as bragging rights, competition, and confidence relative to others [29, 30, 27]. The social aspects of achievement, rather than intrinsic achievement-related motivation, stood out. This implies that mobile quiz shows are based on the competition not only among app users but also among offline peer groups. Game researchers usually bundle the motives of interactivity and social integration into the same category. However, these motivations are distinct in mobile quiz apps. Interactivity, in these apps, is about interaction within the apps (e.g., chatting



Table 3. Linear Regression Result of Effect of Motivation on Behavioral Pattern (n=293)

Variable	Interactivity ( $\beta$ )	Integration ( $\beta$ )	Achievement ( $\beta$ )	Easy to Enjoy ( $\beta$ )	Incentive ( $\beta$ )	adj. $R^2$	F Value
<b>Participation Pattern</b>							
Frequency of Use	0.011	0.139*	-0.021	0.022	0.188***	0.051	4.12**
Playing habitually	0.083	0.353***	0.071	0.021	0.147***	0.228	18.24***
Higher money, higher participation	-0.060	0.188*	0.122	0.276***	0.047	0.130	9.73***
Participate regardless prize money	0.118	-0.007	0.0433	-0.080	0.339***	0.123	9.17***
<b>Social Behavioral Pattern</b>							
Play together	0.061	0.458***	0.003	0.067	0.039	0.223	17.74***
Recommend to others	0.042	0.445***	-0.016	0.073	0.122*	0.245	19.91***
Share SNS	0.285***	0.272***	0.151**	-0.064	-0.070	0.303	26.41***
<b>Playing Pattern</b>							
Using strategy	0.096	0.219***	0.092	0.243***	0.016	0.167	12.70***
Enjoy the chatting	0.642***	0.086	-0.053	-0.001	-0.053	0.427	44.55***
Play with sound-on	0.222***	0.343***	-0.048	-0.004	0.083	0.233	18.71***
Continue playing after elimination	0.342***	0.226***	-0.004	-0.051	0.087	0.251	20.58***

Note:

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ 

and interacting with the hosts), whereas social integrity is about offline sociality [29, 30, 27, 22]. This suggests that mobile quiz-app users experience in-app and offline interactions differently.

Researchers have identified interactivity and social integration as motivations in live streaming. Interactivity is consistent with the desire for a participatory experience through interacting and communicating with a live streaming community [12, 19, 11, 10]. Scholars have also mentioned the enhancement of relationships through offline social integration as a primary motivation for the use of live streaming [24, 11]. These apps also generate opportunities for the creation of impromptu groups, according to previous studies [11, 12, 25]. These findings imply that mobile quiz shows have features of both live streaming and games.

Moreover, we identified motivations that had not been found in previous studies: ease of enjoyment and financial incentives. These motivations reflect the unique content of mobile quiz shows. Ease of enjoyment can be interpreted as a combination of two factors from the technology acceptance model: ease of use and perceived enjoyment [26]. Lightheartedness, which is represented in quick gameplay and easy-to-learn rules, is a significant factor in users' enjoyment. Similarly, a financial incentive reflects mobile quiz shows' distinct content characteristics. Furthermore, as the money is split among the winners, earning prize money could be an important motive. Several users noted, for instance, that the varying prize levels motivate them to keep coming back. However, it is noteworthy that some other users said that prize money served as an important participatory force in the early stages of app usage but that its importance declined as they continued to use the app.

#### Emphasizing Game Elements to Initial Users and Streaming Elements to Experienced Users

Users' usage experiences should be considered when designing the mobile quiz show applications since perceptual differences exist for the same content. Recognition as a game can be obtained with short-term use, while recognition as live

streaming is likely to occur after repeated use. In particular, the game is an immediate experience associated with a user's immediate perceived motivation. On the other hand, an accumulated experience is crucial to perceiving the mobile quiz show as live streaming. Experiences of regular time schedule, real time, group participation, and interactivity may be obtained after sufficient use; therefore, the tutorial for the initial users should emphasize game-related elements, while the app interface should emphasize the live streaming-related elements for the experienced users.

#### Motivations and Behavioral Patterns

We also examined how motivations are related to both in-app and offline behavioral patterns. Few researchers have examined how self-reported motivations relate to actual in-game behaviors [30]. Moreover, as mobile quiz shows are closely related to offline social integration, it is meaningful to understand how quiz-show app users' motivations affect their offline behaviors. In HCI research, it is important to identify how best to encourage and sustain user participation [23]. Therefore, our findings regarding motivation and usage behavior may provide design guidelines that can drive sustained user participation. The implications for design are as follows.

#### Foster Off-line Social Integration

Regarding participation patterns, we found that a motivation of social integration was positively related to usage frequency and habitual usage. This suggests that offline communication and interaction with other users about the mobile quiz show causes users to frequently (even habitually) use a service. Moreover, offline sociality has a greater influence than in-app interaction on ongoing usage. Although in-app interactivity can promote pleasure after app use, offline sociality actually engenders direct participation. These results imply that tools for helping people gather offline are crucial to increasing an app's participation rate. For example, promotions that target a particular social group—such as one's classmates, coworkers, family members, or fellow club members—may be helpful. In addition, HQ Trivia's "My Friend List" feature enables users

to play together remotely (*"I think that it's fun that we can even play together remotely, since I can see what answers he has chosen since he's on my friends list. It's a fun way to connect,"* says P10). Other such functions for in-app connectivity should be enhanced. For instance, watching friends' answers in real time could intensify the remote social experience.

### **Balance the Chance of Winning**

This study's results indicate that financial incentives play a significant role in usage frequency, habitual use, and participation—regardless of the amount of prize money. However, some users mentioned decreasing their participation due to inadequate prize money: *"I don't play as much as I used to because it is very challenging to make any money through the quiz show, and the payouts per person seem to be getting increasingly lower,"* and *"I enjoy trivia and competing for a money prize 'sweetens the pot' for me. Because the prizes offered by the app are minimal, I have reduced my frequency of play and now occasionally play at least in part because of the entertainment value of the host."* This implies that a quiz show must occasionally make use of the "winner takes all" strategy to grant users the expectation of earning a large amount of money. On the other hand, actual winning experiences also play an important role in persistent use, even when the prize money received in these experiences is small: *"I actually won for the first time last night. It was only \$0.40, but it made me feel great and I sent screenshots out to multiple friends to celebrate,"* and *"I won a game several weeks ago and it was a fun time! After that experience, I want to win again."* Similarly, some users preferred Cash Show to HQ Trivia due to the higher chances of winning in the former: *"I'm starting to enjoy Cash Show a little more since they pay out after only 5 questions instead of having to get them all right. I don't have to win big money just a little bit every now and then."* This implies that the experience of winning is a valuable factor in ensuring that users keep participating in an app. Therefore, it is important to provide multiple users with a chance a winning, even though also jackpot strategy is also occasionally required.

Moreover, the motive of financial incentive provides various research questions for its multidimensionality of magnitude of prize and probability of winning. Future research may be executed for the purpose of maximizing user engagement through balancing these two dimensions. Our findings suggest that the financial incentive does more than simply attract users to the content. The various dimensions and variations in financial incentive may influence users' long-term motivations and usage habits. We could figure out the optimal degree of variability in chances of winning, which causes them to increase participation and engagement.

### **Attract Users with Incentive, Maintain Users with Social Integration**

To summarize the above implications, the motives of offline social integration and financial incentive are crucial for encouraging user participation. However, the degree of these motivations may vary depending on the stage of use. According to in-depth interviews, a number of users said that prize money served as an important participatory force in the early stage of use, but its importance declined with continued

use. When people have used apps for a considerable amount of time, social motivation emerges as a powerful value that drives continued use. Thus, it is important to attract users with financial incentive in the introduction stage and to halt waning motivation and prevent user defections by enhancing social integration. For example, push notifications focused on prize money may operate as important triggers for early-stage users, and those focused on social interaction or interactivity may be effective triggers for users who have used the app for a certain amount of time.

### **Encourage Enjoyment with Interactivity**

Interactivity is highly related to in-app enjoyment and to behaviors such as chat usage and continued play after elimination. Features such as chatting and interacting with the hosts improve user's enjoyment. This finding echoes those of previous studies about the important role that streaming plays in interactivity [25, 10, 19, 28]. For example, P10 enjoyed that the app *"gives the players a chance to talk with the host and get shoutouts"* and P1 said, *"It is fun to ask the host questions about themselves and have them answer in real time. I also think reading live comments about the questions or way the host is talking is enjoyable."* Therefore, tools can be designed to support deeper interactions between users and hosts. For example, "like" and "heart" reactions can be used. Furthermore, a system which supports knowledge-sharing in live streams by applying in-stream summaries and annotations [18] can be applied in the mobile quiz show to leverage the information flow. Future studies could be used to develop a method for designing an interactive live streaming system that supports deeper interactions.

### **CONCLUSION**

Live, mobile-based quiz shows represent a new type of content containing aspects of both gaming and live streaming. To understand this new socio-technological phenomenon, we conducted a mixed method study of mobile quiz show experiences. By analyzing user motivations, behavioral patterns, and attitudes toward this new content, we found that perceptions of this new entertainment format are not a dichotomy of games or live streaming. Rather, there can be a wide spectrum between the two genres depending on users' motivations and behavioral experiences. We also discovered how motivations are related to specific usage behaviors. The current work contributes to new understanding of people's usage behavior with this new type of interactive entertainment. Additionally, our findings have implications for game and entertainment research by providing design implications.

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