



# Understanding Mass Interactions in Online Sports Viewing: Chatting Motives and Usage Patterns

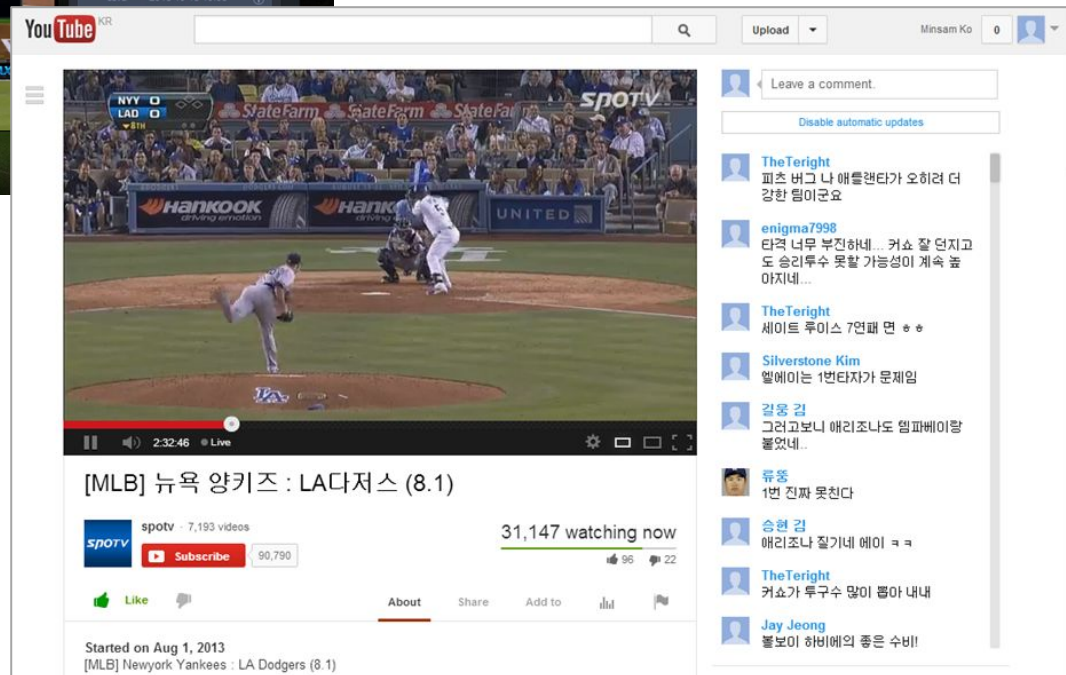
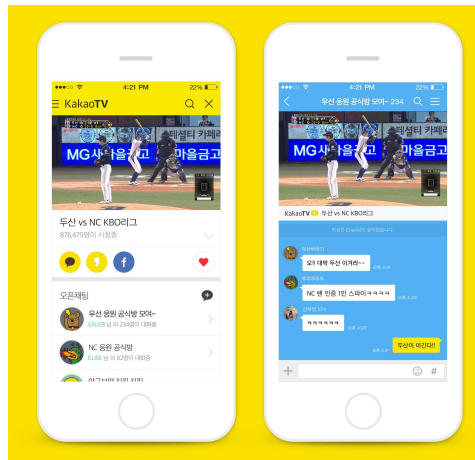
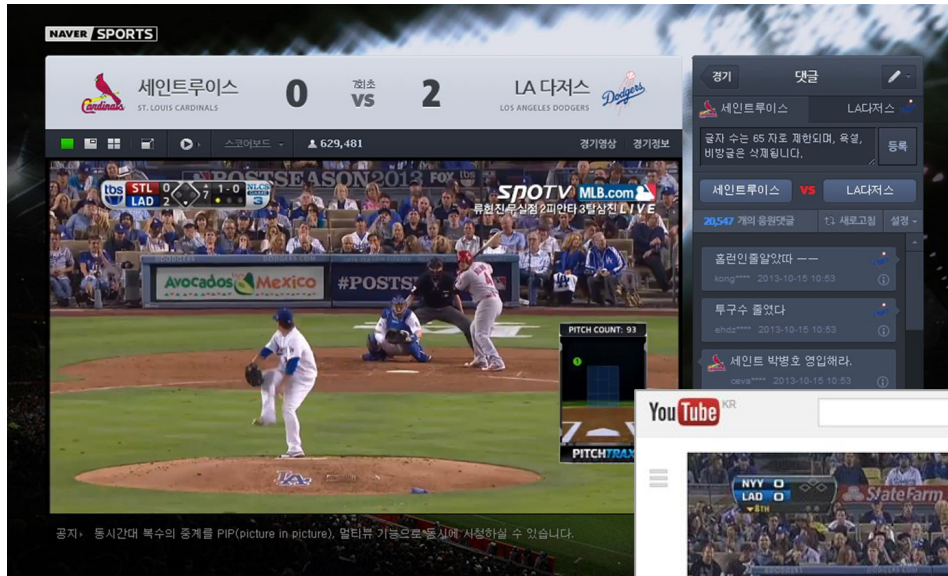
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**Sports watching often occurs in a social context**



Now, we can enjoy sports with others via social TV services

Naver Sports: popular online sports watching service in Korea

## **There are mass Interactions among online sports viewers**

A large number of online viewers utilize a single public space to cheer on their favorite teams, express their feelings, and ask/answer questions

# Related Research to mass interaction in online sports viewing

## Sports viewing



- Contexts: Public (i.e., stadium, bar) vs. Private (i.e., home) [Eastman 97, Gantz 13]
- Motives: Emotional, cognitive, behavioral/social motives [Gantz 81, Zillmann 89, Smith 88, Wenner 88]
- Prior studies primarily focused on offline sports viewers

## Mass interaction



- Information overload problems in mass interactions (i.e., IRC [Jones 04, 08])
- Diverse channels for public mass interaction (i.e., Twitter Group [Budak 13])
- Mass interactions with sports watching have not been studied yet

## Social TV



- Supports for social interactions: content selection and sharing, communication, community building, and status updating [Cesar 11]
- “Chat + videos”: **NaverSports**, CommentTV [Hwang 12]  
vs. “Chat only”: GetGlue, WatchApp
- “Public chat”: **NaverSports**, YouTube Live  
vs. “Private chat”: CollaboraTV , KaKaoTV

Our knowledge of the nature of **mass interactions in online sports viewing** remains limited



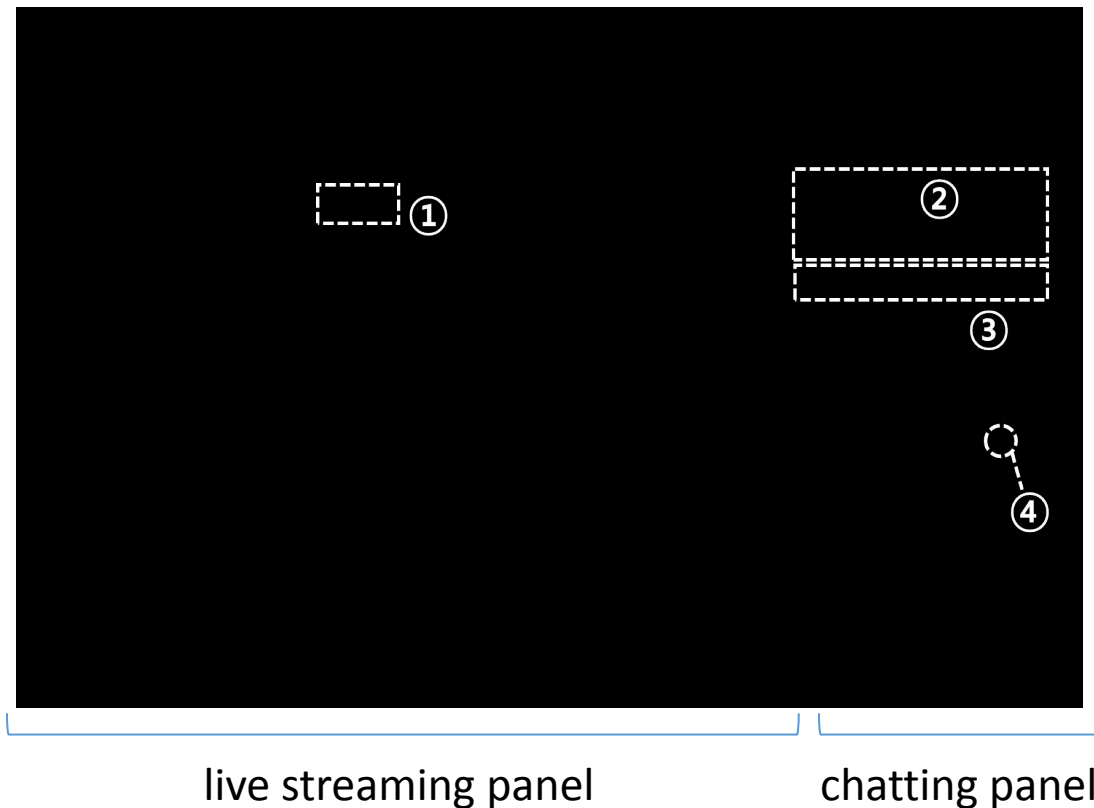
## Mass interaction in online sports viewing

This article deepens  
our understanding of mass interactions in online sports viewing,  
and explores practical ideas for social TV system design

# Dataset: Naver Sports

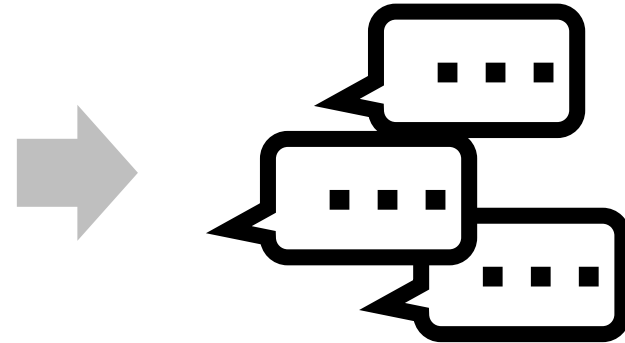
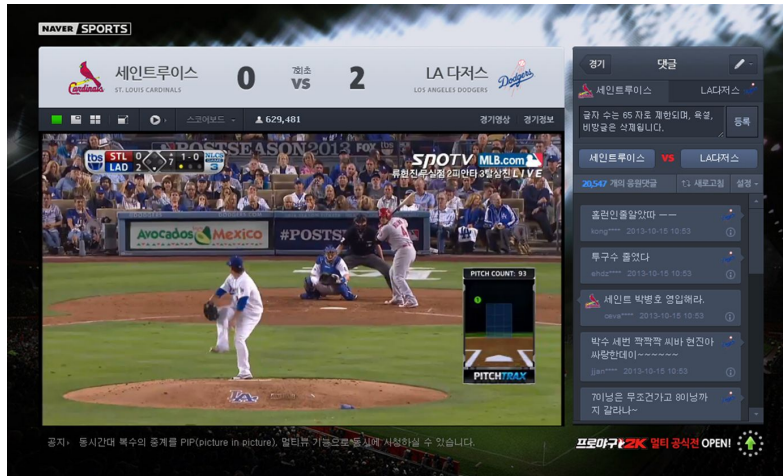
Naver Sports provides online sports viewing experiences

- Live video streams from public broadcasting stations + Realtime chatting
- Diverse sports genres (ex: baseball, soccer, basketball, golf, e-sports, and so on)



- ① Number of current viewers
- ② Input area for chatting
  - select your a team
  - type your message
- ③ Chat filter to see chats for each team
- ④ Button for reporting abusive users

# Dataset: Naver Sports



## We crawled chat messages in Naver Sports (Dec. 2012 ~Sep. 2013)

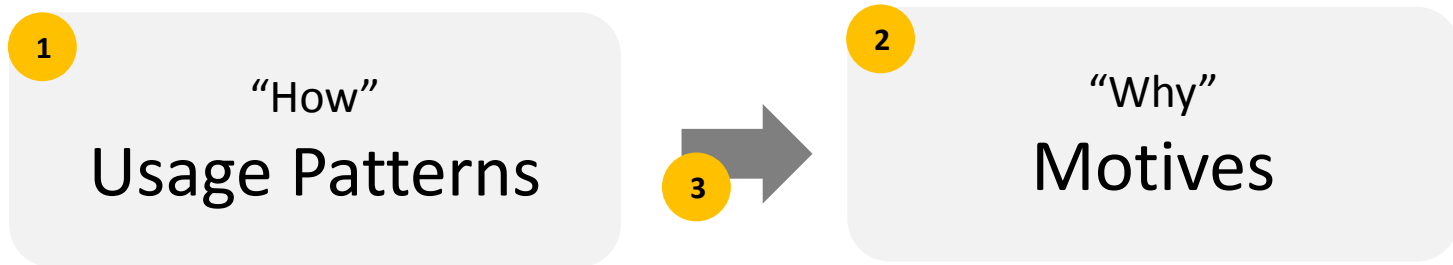
- Popular sports genres in Naver Sports: Baseball, soccer, basketball, and e-sports
- 6,475,159 chats by 105,221 unique chatters
- Chat message = {Game ID, User ID, Message text, Favorite team (i.e., the team selected when the user posted the chat message), Posted time}



# Study overview

We followed a theoretical framework of Uses and gratifications theory (UGT) that examines how and why of media use [Blumler 74]

- Widely used to understand various media (Facebook [Joinson 08; Spiliotopoulos 13] blogs [Kaye 10])



1 What kinds of mass interactions occur in online sports Viewing?

2 Why do users enjoy engaging in mass interactions while viewing online sports?

3 How are these motives related to online sports viewing behaviors (physical/social context and chatting patterns)?

# RQ1: What are mass interactions in online sports viewing?

## Study overview

### **Quantitative Analysis**

Quantified interactivity of Naver Sports users (e.g., chat speeds)

### **Qualitative Analysis**

Content analysis on chats to explore their topics of discussion and the functions of their interactions

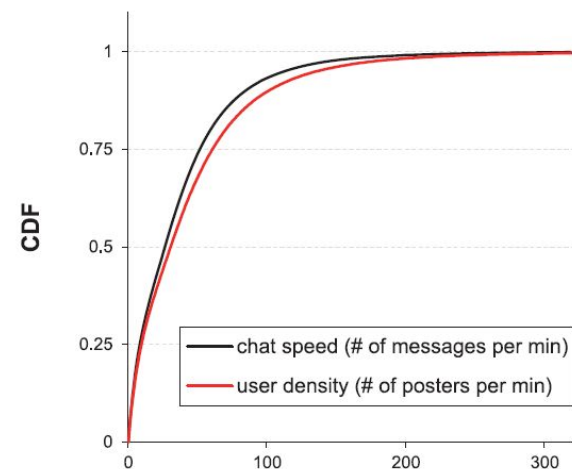


Similarities with and differences from experiences in related areas  
such as social TV and offline sports viewing

## 1. Quantitative analysis chat log analysis on 6,475,159 messages

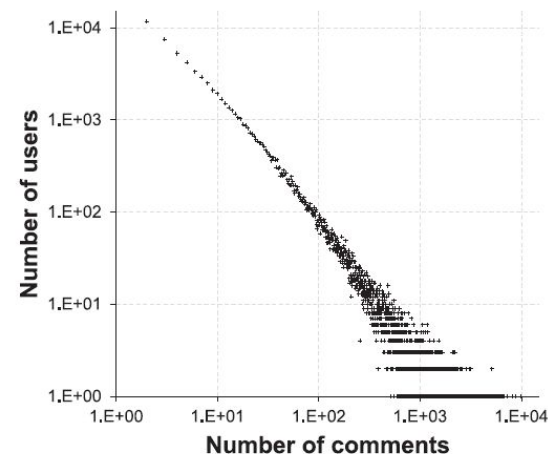
### “Fast” and “short” chat messages among many co-viewers ( > IRC settings [Jones 08] )

- # of Viewers per minute: 34,331
- # of Comments per minute: 47.09
- # of Posters per minute: 41.60
- # of words per message: 4.00



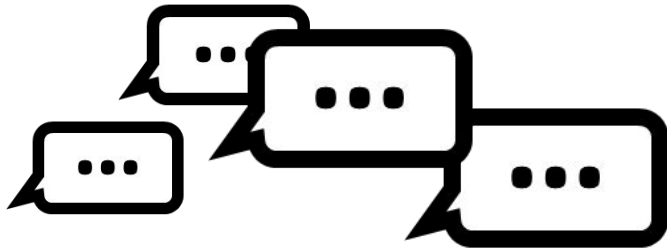
### “A small number of active users” posted a large number of messages.

- 58.5% posted fewer than ten messages during the period
- Top 10% of chat participants posted 79.9% of the messages
- It follows a power-law nature of user participation (similar with Twitter [Budak 13] and UseNet [Whittaker 97] )



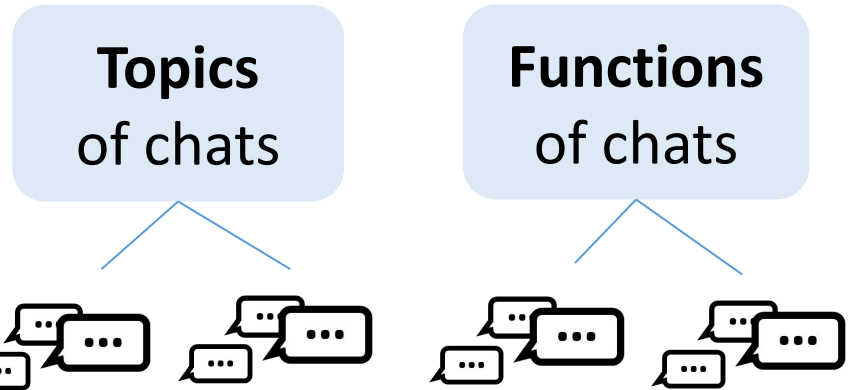
## 2. Qualitative analysis

Content analysis on 2500 sampled messages



**2,500 sampled messages**

25 start points (randomly selected)  
X 100 consecutive chats



**Affinity diagramming**

## 2.1 Topics of chats content analysis on 2500 sampled messages

Our analysis results show that chats in Naver Sports were **“topically coherent”** with a broader theme of sports games



Players and plays



Teams



Commentators



Mascots

## 93.5% of chats related to sports

- Live sports events (e.g., interpreting and commenting on events and cheering for players and teams)
- Peripheral matters (e.g., cheerleaders, game commentators, other matches, and other sports genres)

# RQ1: What are mass interactions in online sports viewing?

## 2.1 Topics of chats content analysis on 2500 sampled messages



Breaking news



Advertisement



Self-expressions

### 6.5% related to non-sports

- Celebrities or products in the advertisements on a live video
- Trending topics (e.g., breaking news) and self-expressions from the viewers (e.g., statuses like “I’m hungry, now”)

### 2.2 Functions of Chat Interactions content analysis on 2500 sampled messages

Our coding analysis results revealed four representative functions of chats

#### **Commentating (50.2%)**

- Interpretation, evaluation, prediction, instruction, and discussion of game events  
(EX, *“His third pitch was a strike”*)

#### **Emotional responses (31.8%)**

- Simple emotions about specific plays
- Responses to other chats  
(funny chats including jokes)

#### **Cheering and jeering (13.4%)**

- Encouraging, calling player’s nicknames, singing fight songs
- Discouraging, mocking each other

#### **Questioning/answering (8.7%)**

- Seeking for game info. (missed events, team/player issues)
- Answering to others’ questions

### Summary

# of co-viewers in Naver Sports was **large** (34,331 co-viewers), and the speed was **fast** (47.09 msg per minute)

- > IRC settings [Jones 08]

Both topics and functions of chats are closely related to a current sports video

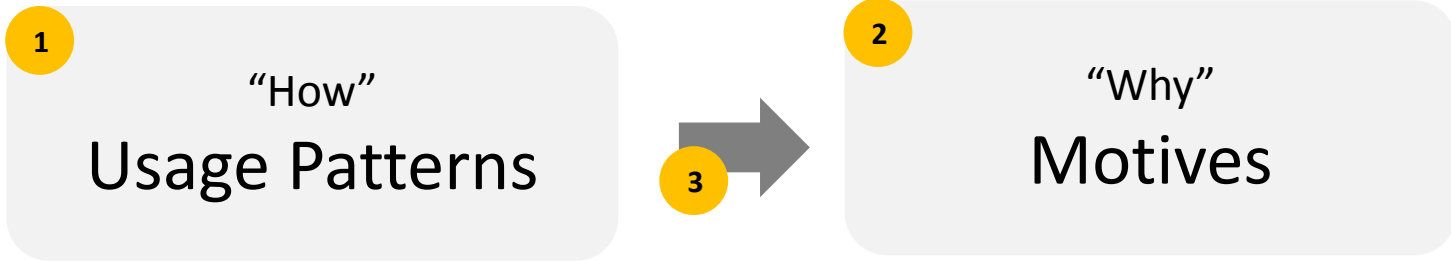
- Similar to the chats of offline sports viewers [Eastman and Land 1997]

But, **personal conversations were rarely observed** in Naver Sports

- Possibly due to weak interpersonal relationships among co-viewers
- Also, information overload—highly coherent content requires much less processing overhead than diverse content



# Study overview



1 What kinds of mass interactions occur in online sports Viewing?

2 Why do users enjoy engaging in mass interactions while viewing online sports?

3 How are these motives related to online sports viewing behaviors (physical/social context and chatting patterns)?

### Study Procedure

#### **STEP 1. Exploratory study via online surveys**

- We found important expressions about users' motives from our survey responses in a free-text format

#### **STEP 2. Questionnaire generation based on the motive expressions**

- 26 items on a 7 point Likert scale were generated
- EX) [I enjoy Naver Sports chatting because] "I want to share my own witty interpretation of the game situation to others"

#### **STEP 3. Large-scale survey to measure Naver Sports users' motives**

- 1,123 Naver Sports users responded to our survey

#### **STEP 4. Factor analysis to identify representative themes of motives**

- We iteratively conducted exploratory factor analysis
- Finally, we found seven factors which represent key themes of motives

Items	Mean (SD)	F1	F2	F3	F4	F5	F6	F7
<b>Sharing Feelings and Thoughts (7 items, a = 0.871)</b>	<b>4.59 (1.29)</b>							
I want to share my own witty interpretation of the game situation to others.	4.67 (1.72)	.692						
I want to know how others respond to my chat messages about feelings and thoughts.	4.43 (1.82)	.670						
I want to confirm whether others have the same feelings and thoughts about the game.	5.09 (1.53)	.636						
I want to engage in the discussion and conversation occurring in the chat room.	4.15 (1.78)	.603						
I want to express my feelings about the game in writing.	4.73 (1.69)	.590						
I want to express agreement or disagreement with others' opinions.	4.15 (1.85)	.580						
I can express my thoughts, interpretations, and predictions about the game situation.	4.88 (1.67)	.533						
<b>Fun and entertainment (4 items, a = 0.788)</b>	<b>4.64 (1.38)</b>							
Chatting is fun and enjoyable in itself.	4.36 (1.81)		.726					
I want to see witty, humorous expressions about the game situations.	4.95 (1.71)		.725					
I pass time with chatting particularly when the game is boring.	4.85 (1.75)		.687					
Reading others' expressions of happiness and laughter makes me feel like I'm having more fun.	4.40 (1.82)		.574					
<b>Information Offering (3 items, a = 0.872)</b>	<b>4.19 (1.56)</b>							
I can answer others' questions.	4.19 (1.73)			.825				
I can provide useful information to others.	4.25 (1.73)			.801				
I can correct false information stated by others.	4.12 (1.79)			.777				
<b>Information Seeking (3 items, a = 0.874)</b>	<b>4.61 (1.59)</b>							
I can ask questions about something I do not know while watching a game.	4.55 (1.82)			.862				
I can see answers to the questions posed by those who have the same information needs.	4.63 (1.75)			.851				
I can learn some useful information about the game rules, team, players, etc.	4.66 (1.75)			.776				
<b>Emotional Release (3 items, a = 0.767),</b>	<b>4.39 (1.51)</b>							
I can express my excitement in writing just as if I were shouting in a stadium.	4.66 (1.83)					.748		
Expressing excitement and anger relieves my stress build-up.	3.85 (1.83)					.657		
I can feel more intense excitement as I read others' reactions when there are dramatic and tense moments in the game.	4.65 (1.82)					.633		
<b>Intra-membership (3 items, a = 0.811)</b>	<b>4.31 (1.56)</b>							
Fans can be united by cheering on their teams and favorite players together.	4.38 (1.81)						.814	
It makes me feel like I am a fan of our team.	4.63 (1.75)						.748	
Seeing opposing fans' cheering stimulates my sense of rivalry and encourages me to cheer on our team.	3.93 (1.94)						.581	
<b>Inter-membership (3 items, a = 0.716)</b>	<b>3.56 (1.53)</b>							
I want to boo the opposing team and its fans.	2.62 (1.76)							.791
I want to defend our team against critics and insults from the opposing team's fans.	4.11 (2.04)							.749
Seeing opposing fans' cheering stimulates my sense of rivalry and encourages me to cheer on our team.	3.93 (1.94)							.549

# Large-scale survey

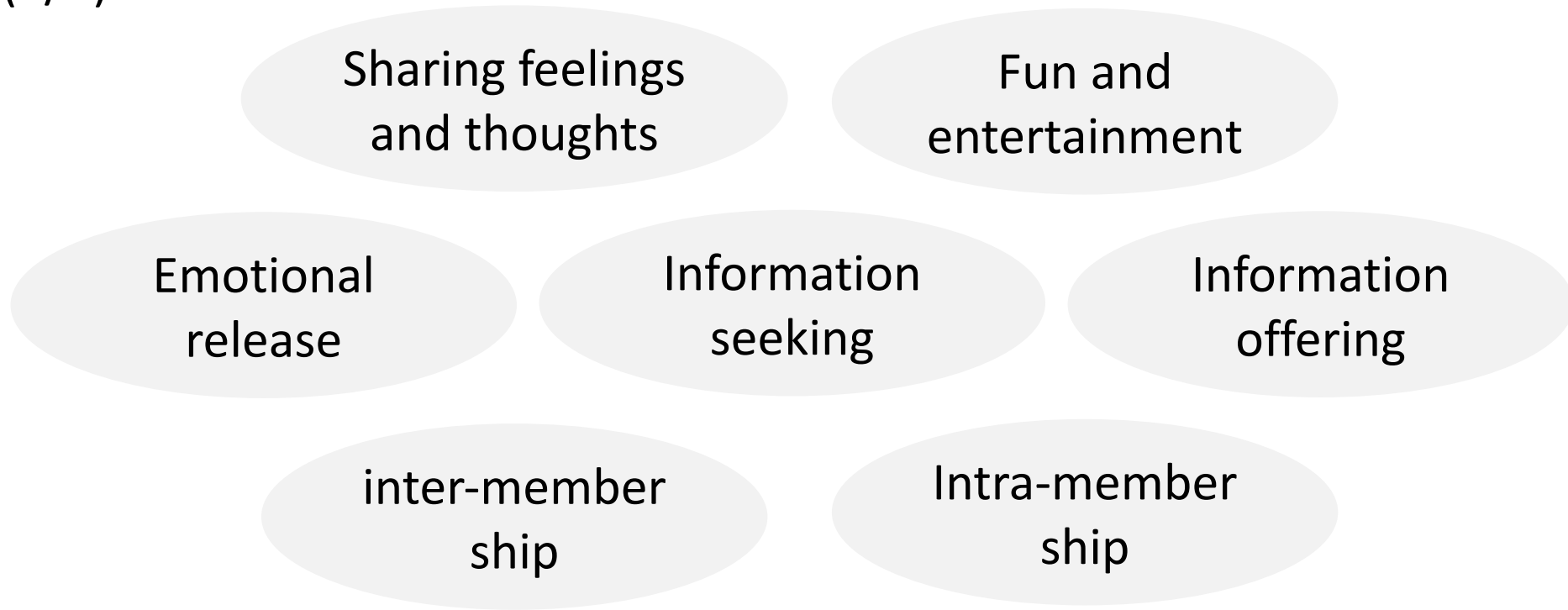
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# Factor analysis results

Please refer to the paper for the details

## RQ2: Why do users enjoy engaging in mass interactions?

### Seven motives for mass interaction in online sports viewing (1/5)

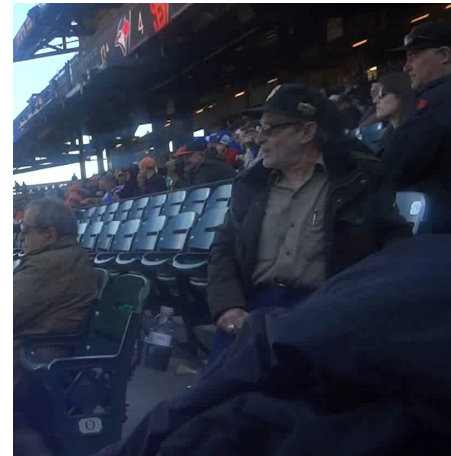
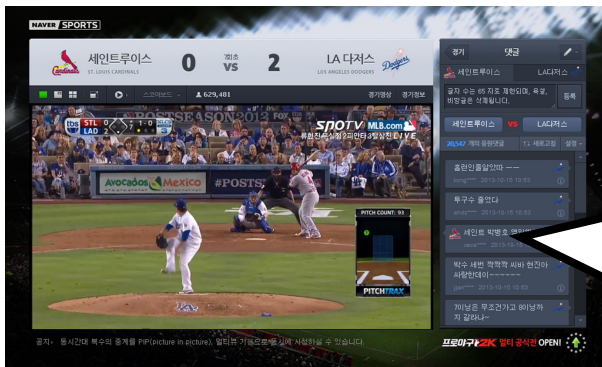


- Our factor analysis groups relevant question items according to the survey participants' responses
- Finally, it revealed seven factors which explained 69.32% of the variance (Eigenvalues > 0.8)

### Seven motives for mass interaction in online sports viewing (2/5)

#### (1) Sharing feelings and thoughts (7 items, $\alpha = .871$ )

- Sharing feelings and thoughts about game play
- Checking others' responses or discussing current events
- EX) [I enjoy Naver Sports chatting because] “I want to confirm whether others have the same feelings and thoughts about the game”



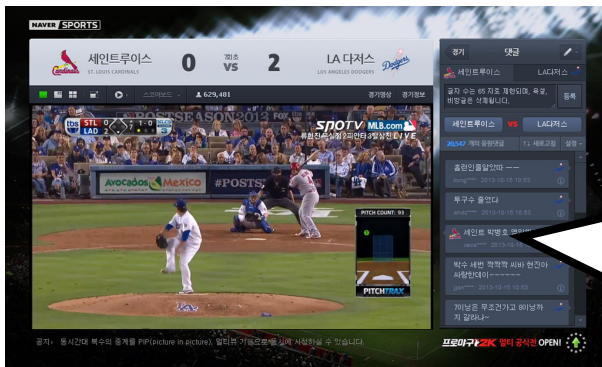
“He’s good here!”

### Seven motives for mass interaction in online sports viewing

(2/5)

#### (2) Fun and entertainment (4 items, $\alpha = .788$ )

- Chat messages were fun to read or that chatting made watching games more enjoyable (ex: Joking or laughing)
- EX) [I enjoy Naver Sports chatting because] “I want to see witty, humorous expressions about the game situations”

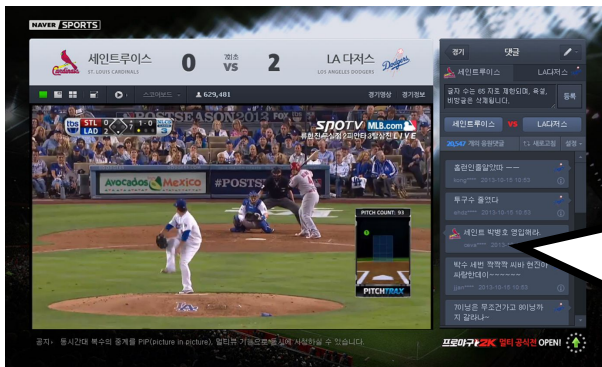


“Ha ha ha ha!”

### Seven motives for mass interaction in online sports viewing (3/5)

#### (3) Information seeking (3 items, $\alpha = .874$ )

- Asking questions and learning by reading others' msg
- Related to motives of becoming fans by learning about the rules or teams  
[Gantz 81, Wenner 98]
- EX) [I enjoy Naver Sports chatting because] “I can ask questions about something I do not know while watching a game”

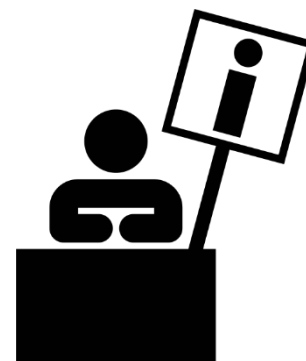


## RQ2: Why do users enjoy engaging in mass interactions?

### Seven motives for mass interaction in online sports viewing (3/5)

#### (4) Information offering (3 items, $\alpha = .872$ )

- Providing useful information to understand game events and answering others' questions
- Teaching about sports has the function of legitimizing and socially rewarding participants [Eastman 97]
- EX) [I enjoy Naver Sports chatting because] “I can provide useful information to others”



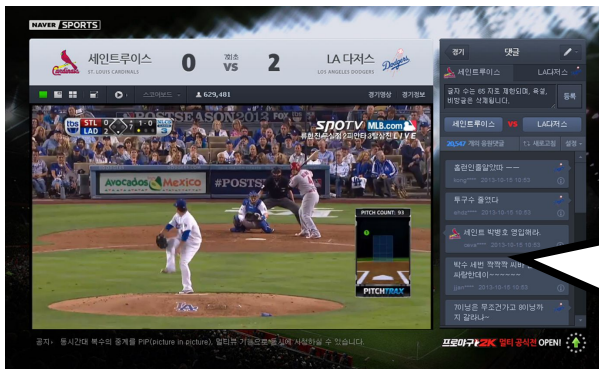
*“He was just out.”*



### Seven motives for mass interaction in online sports viewing (4/5)

#### (5) Intra-membership (3 items, $\alpha = .811$ )

- Referred to fanship or group affiliation [Wann 1995]
- The items in this factor focused on the use of chats to cheer on their favorite teams and to strengthen group cohesion
- EX) [I enjoy Naver Sports chatting because] “It makes me feel like I am a fan of our team”

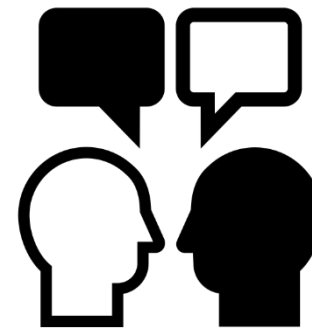
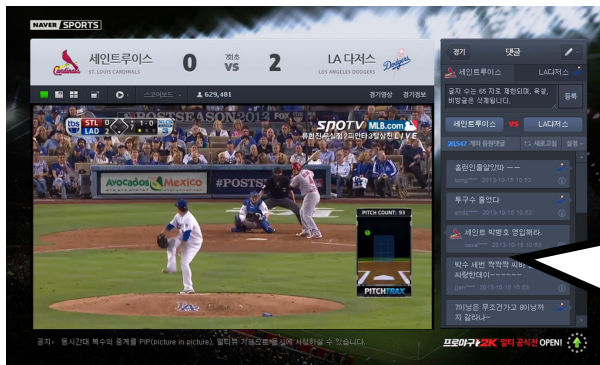


*“Let’s go Giants!”*

### Seven motives for mass interaction in online sports viewing (4/5)

#### (6) Inter-membership (3 items, $\alpha = .716$ )

- Reflecting competitive behaviors against other teams
- Jeering the opposing teams/fans and defending their own team against insults from the opposing team's fans
- EX) [I enjoy Naver Sports chatting because] “I want to defend our team against critics and insults from the opposing team's fans”

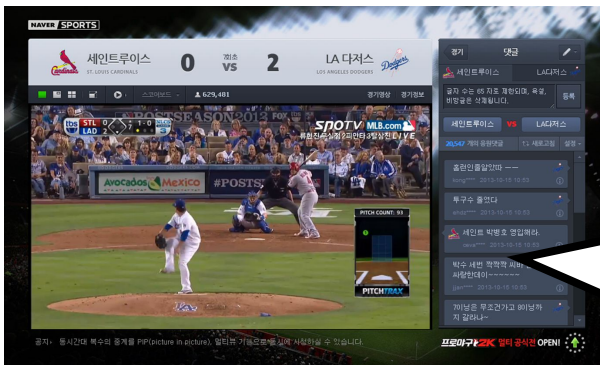


“Hey! Be quiet!”

### Seven motives for mass interaction in online sports viewing (5/5)

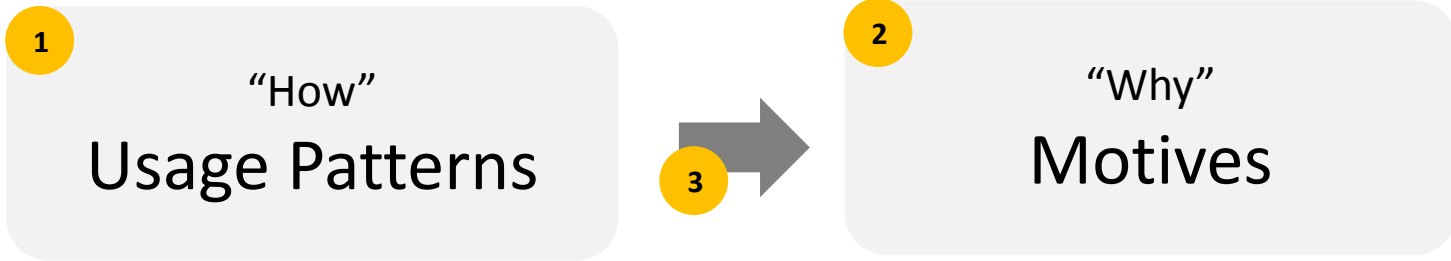
#### (7) Emotional Release (3 items, $\alpha = .767$ )

- Reflected the users' desire to express their emotional feelings
- Enjoyable sports viewing involves applauding and shouting in pleasure, as well as yelling in displeasure or anger [Gantz 81]
- EX) [I enjoy Naver Sports chatting because] “I can express my excitement in writing just as if I were shouting in a stadium”



“Woo~~”

# Study overview



- 1 What kinds of mass interactions occur in online sports Viewing?
- 2 Why do users enjoy engaging in mass interactions while viewing online sports?
- 3 How are these motives related to online sports viewing behaviors (physical/social context and chatting patterns)?

# RQ3: Relationship btw motives and usage behaviors

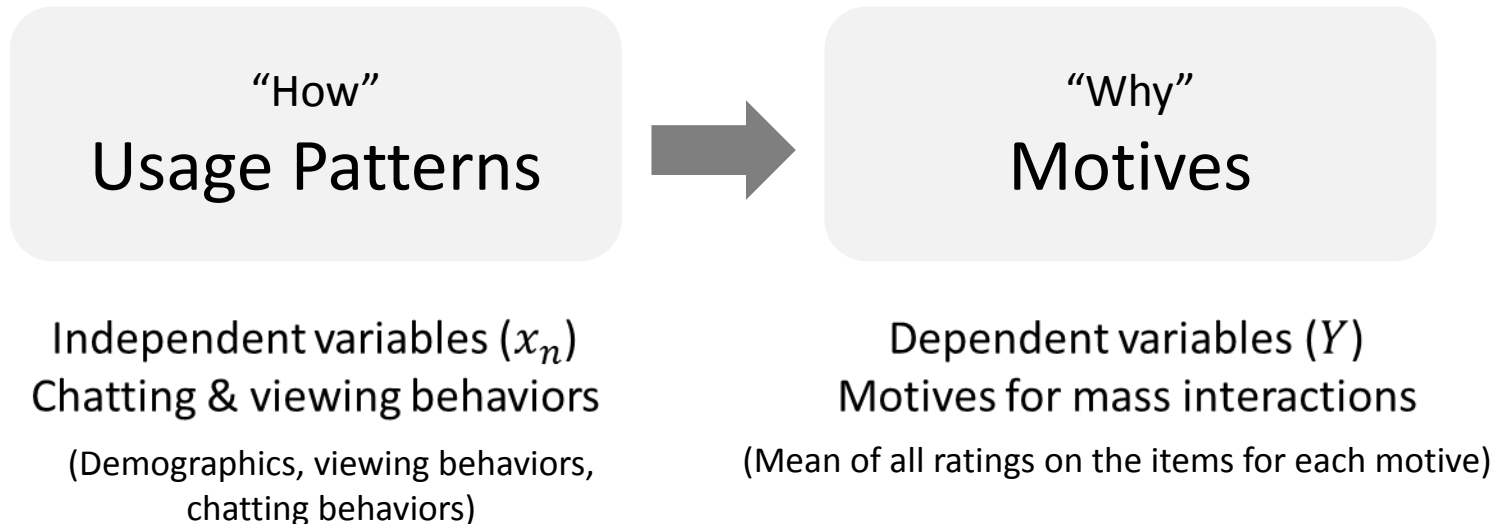
## Study

### overview

We examined how the usage characteristics of social TV were related to motives (multiple regression analyses)

- Relevant usage patterns should be carefully considered in the design of online sports viewing system

$$Y = C + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n$$



## 19 independent variables about usage behaviors

### Demographics

From surveys

- Age
- gender
- hours of computer use

### Viewing behaviors

From surveys

- # of Naver Sports use
- # of Viewing places (home, work, and on the move)
- % of existence of co-viewer
- % of using smart devices for viewing
- % of multitasking while watching

### Chatting behaviors

From surveys

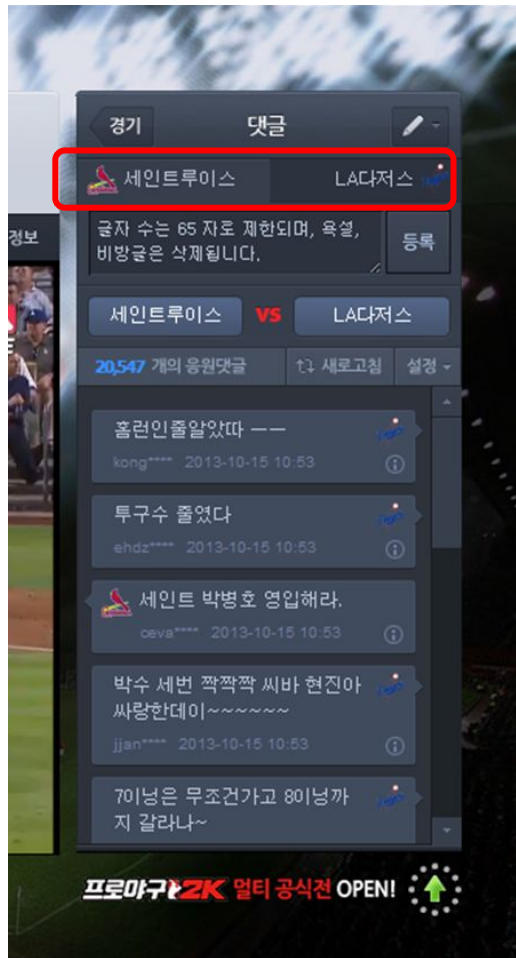
- # of checking a chat room
- # of reporting abusive users
- # of using a team-specific chat filter

From chat messages

- # of chats
- Mean message length
- % of positive/negative messages by NLP analyzer
- Fanship
- % of question-type comments  
(containing a question mark or 5W1H)

19 independent variables about usage behaviors

**Fanship measurement (independent variable)**



Team selection in posting chat message

- Naver Sports allows users to pick a favorite team that reflects fan-identity

We measured fanship based on the consistency of the team selection for chatting.

- Consistency of the team selection is measured based on **entropy equations**

$$FanLoyalty_n = 1 - \left( \frac{-\sum_{t \in T_u} p_{u,t} \cdot \log_2 p_{u,t}}{\log_2 |T|} \right), \quad p_{u,t} = \frac{C_{u,t}}{\sum_{t \in T_u} C_{u,t}}$$

- Entropy == 0: focus on a team  
1: equally select all the teams

## RQ3: Relationship btw motives and usage behaviors

### Regression analysis results

	Statistics		Standardized Beta						
	Mean	SD	Sharing Feelings/ Thoughts	Fun & Ent.	Info. Offering	Info. Seeking	Emotional Release	Intra- Membership	Inter- Membership
Age	21.4	8.31	.073*	.071*	-.035	-.020	.101**	.046	.015
Gender	.121	.327	-.082**	-.079**	-.106***	-.023	-.022	-.009	-.035
ComputerUseHours	5.93	4.00	.006	.005	-.020	.009	.014	-.038	-.017
ViewingFrequency	2.74	0.89	.026	-.073**	.043	-.028	.008	.109***	.093**
LocationHome	.883	.321	.014	.057*	-.002	.025	.025	-.027	.011
LocationWork	.194	.396	-.041	.025	-.038	-.004	-.014	.008	-.023
LocationMobile	.384	.487	.024	.041	-.007	.007	.004	.014	.026
WatchingAlone	.948	.223	-.027	-.008	-.034	-.042	-.028	-.045	-.023
SmartDeviceUse	.616	.487	.074*	.041	-.004	.058†	.056†	.050	.028
Multitasking	.553	.497	.068*	.063*	-.003	.016	.028	-.003	.033
CheckingChats	4.66	1.54	.440***	.529***	.232***	.282***	.404***	.312***	.260***
AbuseReporting	3.67	2.20	-.018	-.043	.137***	.065*	.011	.031	.047
TeamFiltering	.132	.338	.033	.027	.035	.036	-.006	.087**	.047
ChatTotalCnt	114	539	.015	-.043†	.066*	.051†	-.042	.027	.047
FanLoyalty	.747	.280	-.062*	-.057*	-.103**	-.060*	-.029	.066**	.056†
MsgLength	4.00	1.82	.017	-.087**	.021	-.049	-.053†	-.069**	-.022
QuestionRate	.103	.165	-.001	.039	-.030	-.013	.013	.007	.013
SentimentPosRate	.371	.281	.023	.057*	-.018	-.005	.031	.039	.010
SentimentNegRate	.132	.184	.030	-.004	.003	-.008	.010	.020	.020
$R^2$			.217***	.306***	.130***	.111***	.176***	.136***	.105***

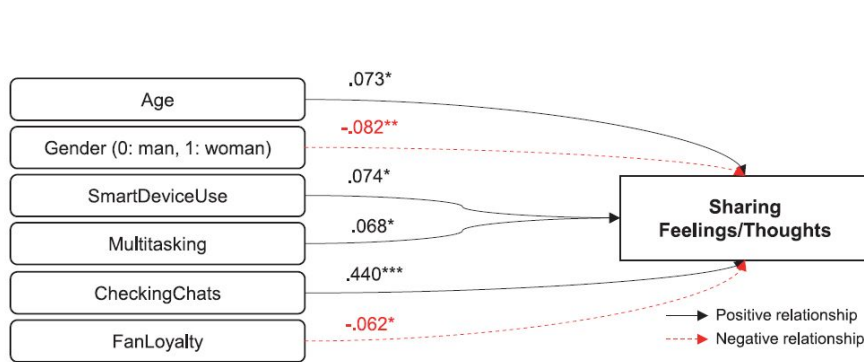
† p < .1, \* p < .05, \*\* p < .01, \*\*\* p < .001.



## Regression analysis

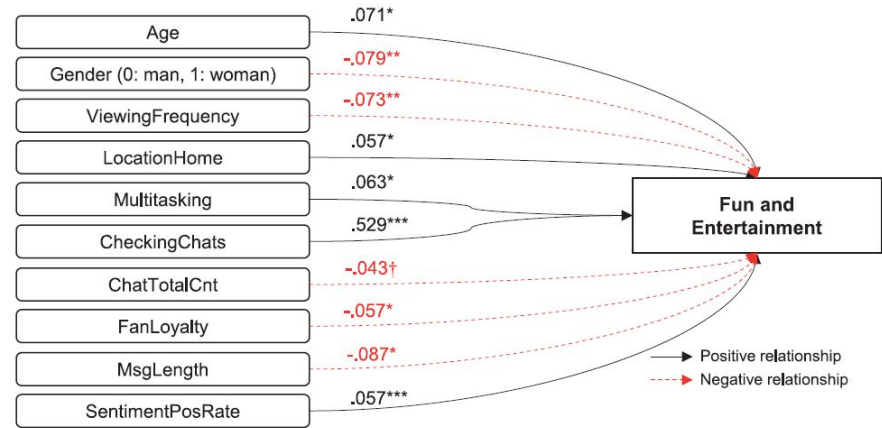
### results

#### (1) Sharing Feelings and Thoughts



- Multitaskers
- Less fanship
- Mobile viewers

#### (2) Fun and Entertainment



- Multitaskers
- Less fanship
- Short and positive messages  
(with smile emoticons)

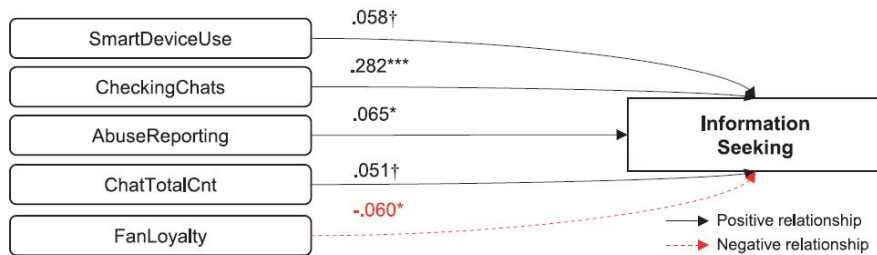
**Game result is not serious** for these motives (less fanship and multitasking)

**Chatting/communicating with others** is more important for them

## Regression analysis

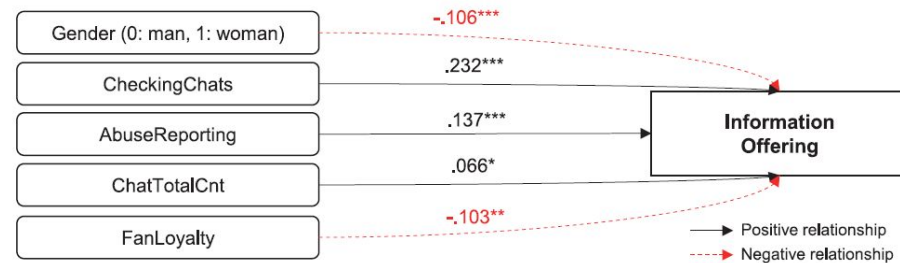
### results

#### (3) Information Seeking



- Frequently posting chat messages
- Sensitive to abusive users  
(Frequent use of AbuseReporting)
- Less fanship (seeking for generals)
- Frequent mobile viewing

#### (4) Information Offering



- Frequently posting chat messages
- Sensitive to abusive users  
(Frequent use of AbuseReporting)
- Less fanship (Offering generals)

They are **chatters** and **hate distractions by abusive messages**

For **mobile viewers**, chatting is useful source for information

## Regression analysis

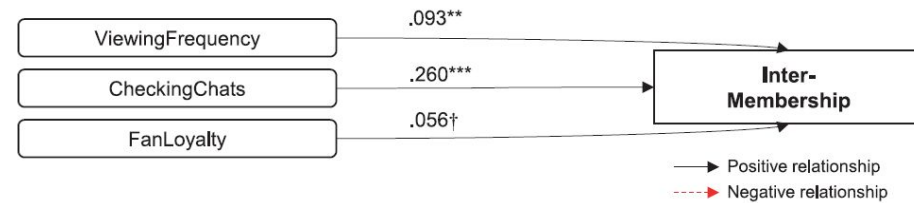
results

### (5) Intra-Membership



- Frequently viewing games
- High fanship
- Frequent use of team filtering  
(Want to see my team chats only)

### (6) Inter-Membership



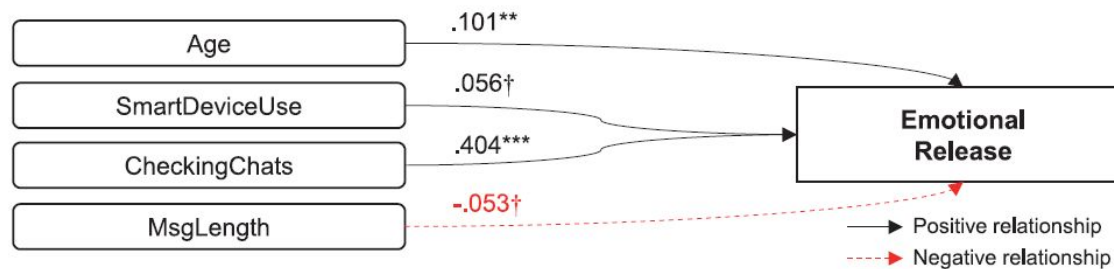
- Frequently viewing games
- High fanship

They are **active fans on one or two teams**, and don't miss their team's game

They also often **filter out against fans' talks**

# Regression analysis results

## (7) Emotional Release



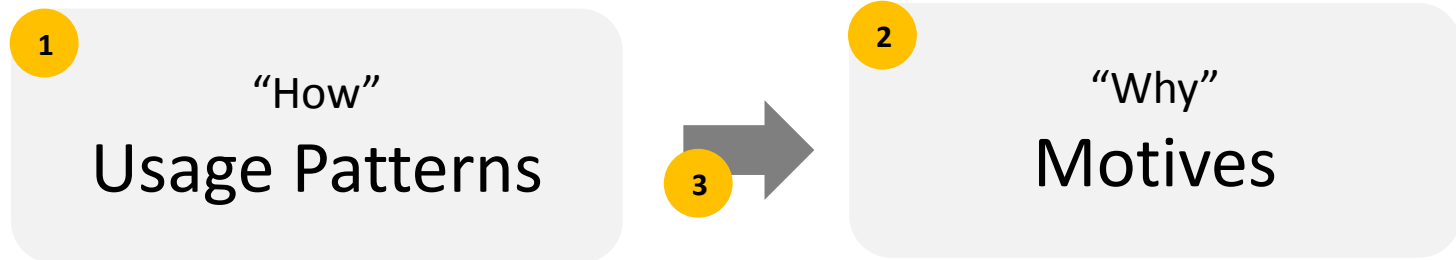
- Short messages (with emoticons)
- Frequent use of mobile devices for viewing

They release their **emotions** by various emoticons during a game

Also, they **frequently use mobiles** for their watching

# Summary

## UGT Analysis on mass interactions in online sports viewing



- 1 What kinds of mass interactions occur in online sports Viewing?
  - Many viewers, Fast chat speed, Short length
  - Sport-related topic and functions (rather than personal matters)
- 2 Why do users enjoy engaging in mass interactions while viewing online sports?
  - Sharing feelings and thoughts, Fun and entertainment, Emotional release
  - Information offering, Information seeking, Intra-membership, inter-membership
- 3 How are these motives related to online sports viewing behaviors?
  - Several usage behaviors were significantly related to the seven motives



### Making chats more enjoyable

- “Fun & Entertainment” and “Emotional Release” motives were related to use of short messages with emoticons
- Supporting for expressing viewers’ feelings and displaying co-viewers’ overall emotions will gratify these motives better.



### Fostering information sharing environments

- Information seeking/offering motives were related to use of reporting abusive users, possibly because they want to focus on their conversations
- Providing better information sharing environments (intelligent filters or QnA tags) will be helpful in sharing information



## Leveraging Membership Motives

- Membership motives were related to skewed team selection (fanship) and team chatting filters which represents fan-identity
- It should help viewers express their fan identity (EX, badge, # of fans on each team)



**Thank you!**