Relationship of Usage Objectives and Anonymity Consciousness to Self-disclosure in Twitter Profiles: A Cross-cultural Study

Tomu Tominaga[1]**, Yoshinori Hijikata**[2]**, and Joseph A. Konstan**[3]

[1]**Graduate School of Engineering Science, Osaka University**
[2]**School of Business Administration, Kwansei Gakuin University**
[3]**GroupLens Research, University of Minnesota**

Corresponding author:
First Author[1]

Email address: tominaga@hlab.sys.es.osaka-u.ac.jp

ABSTRACT

Social media –particularly services like Twitter where most content is public– present an interesting balance between social benefits and privacy risks. Twitter users have various usage objectives in order to gain social benefits. We introduce the concept of "anonymity consciousness" as users' intention to avoid being identified and reached by strangers when engaging in public space. In this study, we present a cross-cultural study in order to investigate self-disclosure in Twitter profiles, usage objectives on Twitter, and anonymity consciousness and examine how self-disclosure is influenced by usage objectives and anonymity consciousness. Specifically, this study targets Twitter users in the United States, India, and Japan. We find: (a) Indian users are more likely to disclose their personal information and have weak anonymity consciousness than US and Japanese users, (b) users in every country are less likely to disclose their real name if they have stronger anonymity consciousness, and (c) US users tend to disclose their web-page link and Japanese users tend to disclose their affiliation when they desire to advertise themselves on Twitter.

INTRODUCTION

Background

One of the challenges people face when using social media –particularly with services like Twitter where most content is public– is that they have to balance their desires to communicate socially with their desires to remain private in their personal lives. Users on social media can receive emotional and social support or useful and interesting information (Ellison et al., 2006) connecting with their family, friends, or colleagues on the sites. To make connections with acquaintances, users usually expose their personal information on their profile page for being identified by them. However, self-disclosure on social media can be tied to a risk that users can be identified and reached by a third party. It is difficult for users to control self-disclosure of personal information in their profiles as balancing social benefits and privacy risks.

Self-disclosure relates to usage objectives on social media as discussed before (Chang and Heo, 2014; Hollenbaugh, 2011; Stutzman et al., 2012; Lai and Yang, 2014). For example, Twitter users may put their web-page links when they aim to promote themselves for personal or professional reasons. On the other hand, if Twitter user had a motive to communicate with their friends such as school friends, they would disclose their nicknames used offline instead of real names, and write their interests or preferences for making conversations on Twitter.

Self-disclosure also depends on the users' desire to be reached or avoid being reached by strangers. Here, we define anonymity consciousness as the intention to avoid being identified and reached by strangers when engaging in a public space. This concept can be found offline and online. For example,

someone who is interviewed for the news may wish to avoid having his or her name or photo used for publication to avoid being recognized or contacted by strangers. Similarly, a Twitter user, while posting information for personal or professional reasons, may withhold personal contact information from his or her profile to avoid being identified and reached. Anonymity consciousness arises because of the need or desire to engage in public spaces while still maintaining a degree of personal privacy. We note that we are not studying cases where people want to be anonymous for purposes of hiding connections between their identities and online participation from people who know them already.

Anonymity consciousness is related to but distinct from privacy concerns as described by Smith et al. (1996) and Margulis (2011). Conventionally, privacy concerns refer to concerns for information privacy, defined as the ability of the individual to personally control information about one's self between the self and a communication partner (Smith et al., 1996). Margulis reviewed three major theories of privacy (Petronio and Altman, 2002; Westin, 1968; Altman, 1975), and stated that the essence of privacy is "control over transactions between person(s) and other(s), the ultimate aim of which is to enhance autonomy and/or to minimize vulnerability" (Margulis, 1977). In other words, a common feature between anonymity consciousness and privacy concerns is that these concepts represent anxiety, threats, or concerns about one's identifiable personal information in the context of interactions. What distinguishes anonymity consciousness from privacy concerns is the context of engaging in a public space. If you tell certain information to a specific communication partner (a person or business), you may have a privacy concern that it will be inappropriately used or shared by them. Anonymity consciousness, however, focuses on the information that you are sharing publicly – you are balancing the benefits of participating in a public space against the concern that (possibly unknown) others may follow you back into your private life.

In this study, we examine how self-disclosure of personal information in social media correlates with usage objectives and anonymity consciousness. Especially, we highlight self-disclosure of personal information on Twitter. As discussed by Choi and Bazarova, it is more difficult to control and grasp the audience on Twitter than Facebook. Twitter allows unidirectional following relationships among users; therefore several types of audience including unknown strangers are brought into one community ("context collapse' (Marwick and Boyd, 2011)). Twitter users can protect their posts from strangers by setting as non-disclosure mode where tweets are shown only to the followers approved by them however they cannot hide users' profile information such as profile pictures or user names. Previous research on self-disclosing attitudes or behaviors (Hollenbaugh and Ferris, 2014; Chang and Heo, 2014; Bazarova and Choi, 2014; Chen and Sharma, 2015; Cheung et al., 2015; Reed et al., 2016) mainly targeted on Facebook where users can basically control the audience who see the users' information. Thus, investigating self-disclosure of personal information in Twitter profiles, we expect to get novel results differently from previous research and to make general discussion for designing online platforms with few privacy risks.

We define self-disclosure in Twitter profiles, usage objectives on Twitter, and anonymity consciousness as follows. The relationship between these factors is shown in Figure 1. We call it self-disclosure model.

Self-disclosure Items users disclose in their Twitter profiles. In this paper, the following six items are called disclosure items: (1) Real name, (2) Real face, (3) Place they live in, (4) Affiliation they belong to, (5) Links to their web page, (6) Details about their work, hobby, etc.

Self-disclosing behaviors on social media are conducted through various channels such as profile pages, posts, or private messages. Of particular interest in this study is why people disclose personally identifiable information in Twitter. Also, personal information in profile pages are more summarized and static than in posts or private messages. Therefore we targeted self-disclosure of personal information in Twitter profiles, where users cannot completely hide the information with a function provided by Twitter to prevent not-connected users from seeing the users' posts.

Usage objective Objectives users engage in Twitter use. The following six items are usage objectives in this study: (1) Keeping in touch with others, (2) Gathering useful information, (3) Raising visibility of interesting things, (4) Releasing stress, (5) Seeking for help and opinion, (6) Advertising what they have done.

We use (1)–(5) inspired by the conventional report (Zhao and Rosson, 2009), and (6) considering the existence of micro-celebrity or self-branding users (Page, 2012). Previously, researchers have tried to find why people use social media including Twitter (Dimicco et al., 2008; Zhao and Rosson, 2009; Hofer and Aubert, 2013). Among the studies, Zhao and Rosson (2009) investigated how
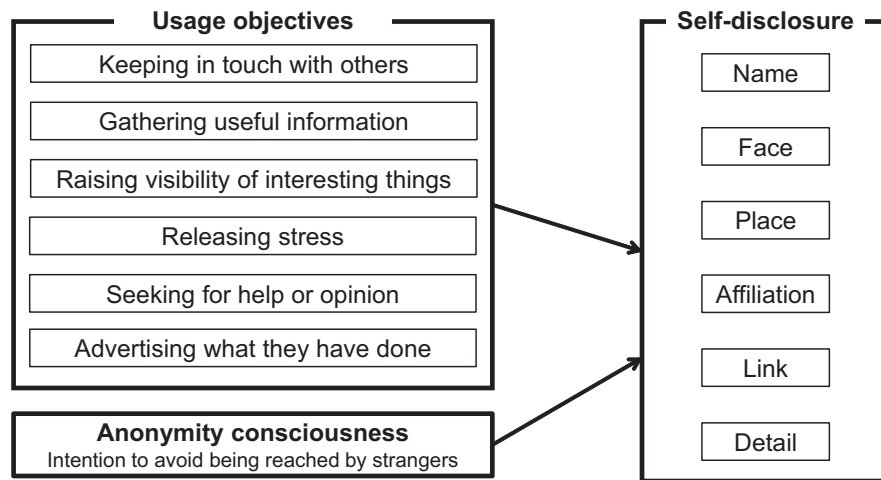
Figure 1. Self-disclosure model (relationship of self-disclosure in Twitter profiles, usage objectives, and anonymity consciousness)

people used Twitter in general directly asking them how and why to use Twitter, and then discussed how Twitter could be used in organizational settings. The investigation itself was to identify general usage objectives of Twitter users; therefore we adopted them.

Anonymity consciousness Intention to avoid being identified and reached by strangers when engaging in a public space. This concept can be found offline and online.

We believe that anonymity consciousness is an important factor to understand when studying users' self-disclosure in a public forum such as Twitter. To study it systematically, we developed a questionnaire to measure anonymity consciousness. The questions are explained later in this paper.

Self-disclosing behaviors deliver one's personal information to others, and its behaviors are influenced by cultural backgrounds behind people (for instance, Asian people are less likely to disclose their personal information to their acquaintances than Western people (Chen, 1995; Asai and Barnlund, 1998; Ting-Toomey, 1991)). It has been discussed that individualism/collectivism culture have an impact on cultural differences in self-disclosure (Chen, 1995; Asai and Barnlund, 1998). However, since social media –especially Twitter, where most contents are public– provide users with a chance to contact with not only their acquaintances but also unknown strangers, the conventional findings (Chen, 1995; Asai and Barnlund, 1998) might not be supported on social media. Thus, we examine self-disclosure of users on social media from the perspective of cultural differences. In this study, we selected the United States, India and Japan as target countries for the examination.

Also, usage objectives and anonymity consciousness may vary by cultural backgrounds of social media users. This is because usage objectives or goals of social media are related to self-disclosure (Krasnova et al., 2012; Stutzman et al., 2012; Lai and Yang, 2014) and cultural backgrounds (Kim et al., 2011; Vasalou et al., 2010). Furthermore, privacy concerns, which is a close concept of anonymity consciousness, are known to correlate with cultural characteristics of people (Bellman et al., 2004; Milberg et al., 2000; Harris Interactive, 1999). In this paper, we observe cultural difference in self-disclosure, usage objectives, and anonymity consciousness.

Purpose

The purpose of this study is to understand what and why users disclose in their Twitter profiles from the perspective of cultural difference. Our goal is summarized in solving the following research questions.

RQ1 *To what extent are self-disclosure, usage objectives, and anonymity consciousness respectively different in the United States, India, and Japan?*

We verify cultural differences in the number of self-disclosing users, the intensity of usage objectives, and the intensity of anonymity consciousness.

RQ2 *To what extent is self-disclosure associated with usage objectives and anonymity consciousness in the United States, India, and Japan?*

We verify the relationship of factors in self-disclosure models for Twitter users in the Unites States, India, and Japan.

RQ3 *To what extent are self-disclosure models different depending on cultural backgrounds?*

We discuss cultural differences in self-disclosure models of U.S., Indian, and Japanese users.

To this end, we develop a questionnaire to ask questions about self-disclosure, usage objectives, and anonymity consciousness. From users' responses, we calculate intensity of their usage objectives for measuring to what extent users give weight to the usage objectives. Also, we calculate intensity of their anonymity consciousness as strength of intention to avoid being identified and reached by strangers.

This is the first study conducting a cross-cultural study to reveal cultural differences in self-disclosure in Twitter profiles, usage objectives on Twitter, anonymity consciousness, and the relationship of these factors. Primary results on our investigation and analysis demonstrate that (1) Indian users tend to disclose themselves more than U.S. and Japanese users, (2) disclosure of real name negatively correlates with intensity of anonymity consciousness in every country, and (3) U.S. users disclose their web-page links and Japanese users disclose their affiliation when advertising themselves.

The present paper is constructed as follows. Firstly we introduce related work. After explaining the reason behind selecting the U.S., India, and Japan for cultural comparison, we show details of the questionnaire survey. We then show the result and implications of our analysis on the research questions. Finally, we state the limitation in this study and summarize this paper.

RELATED WORK

Self-disclosure

Self-disclosure is telling previously unknown personal information to others (Joinson and Paine, 2012). Its behaviors are well known to be influenced by cultural backgrounds behind people (Chen, 1995; Asai and Barnlund, 1998; Ting-Toomey, 1991; Barnlund, 1989). It derives from differences between individualism and collectivism culture (Hofstede et al., 2010).

Self-disclosure on Social Media

Self-disclosure on social media is defined by either actual behaviors (Walrave et al., 2012; Bazarova and Choi, 2014; De Choudhury et al., 2017; Andalibi et al., 2017; Wang et al., 2016; Al-Saggaf and Nielsen, 2014; Liu and Brown, 2014; Choi and Bazarova, 2015) or willingness (or attitudes) (Liu et al., 2016; Dienlin and Metzger, 2016; Lai and Yang, 2014; Nemec Zlatolas et al., 2015; Varnali and Toker, 2015; Tsay-Vogel et al., 2016) of providing personal information. Consistently, concerns for privacy on social media was found to have negative impact on self-disclosure for general U.S. people (Dienlin and Metzger, 2016), Belgium people (Walrave et al., 2012), Slovakia Facebook users (Nemec Zlatolas et al., 2015), Chinese microblog users (Liu et al., 2016), and Turkey people (Varnali and Toker, 2015). According to Tsay-Vogel et al. (2016) investigating privacy attitudes of people for five years from 2010 to 2015, concerns for privacy threats has been getting higher gradually as years go by. Wang et al. (2016) built the machine-learning model to predict to what extent Facebook users disclose personal information thorough posts using text features, link features, and usage features. De Choudhury et al. (2017) or Andalibi et al. (2017) targeted on what people talk on Twitter or Instagram about mental illness. Also, it was reported that people have different attitudes to self-disclosure according to communication channels (e.g. wall posts or private messages) (Bazarova and Choi, 2014; Masur and Scharkow, 2016; Ma et al., 2016). One of the reasons behind the results is that several types of audience including colleagues, friends, or family are joined together into one community, what is called "context collapse" (Marwick and Boyd, 2011). From the viewpoint of how audience perceive self-disclosure of other users, Lin and Utz (2017) stated that if self-discloser revealed a lot of personal information, it is easy for receiver to remember the self-discloser compared to those who revealed less personal information. Choi and Bazarova (2015) extended the study of Bazarova and Choi (2014), and revealed differences in goals of self-disclosure between public Twitter users, protected Twitter users, and Facebook users. Other researchers examine how self-disclosure in social media is related to self-esteem (Forest and Wood, 2012), information control (Christofides et al.,

2009), satisfaction (Special and Li-Barber, 2012), privacy concerns (Joinson and Paine, 2012; Krasnova et al., 2010, 2012), or age (Christofides et al., 2012; Walrave et al., 2012).

Here, we review previous work (Chang and Heo, 2014; Hollenbaugh, 2011; Stutzman et al., 2012; Lai and Yang, 2014) that analyze self-disclosure in the perspective of usage motives in social media. Hollenbaugh and Ferris (2014) and Chang and Heo (2014) examine how usage motives are influential in self-disclosure by regression analysis for general Facebook users or U.S. college students respectively. Hollenbaugh and Ferris (2014) used Wheeless's Revised Self-disclosure Scale (RSDS) (Wheeless, 1978) for measuring self-disclosure. They revised the RSDS to fit within the context of Facebook, and the responses to the questionnaire was adopted as users' self-disclosure. Chang and Heo (2014) investigated what kind of items users disclose (such as e-mail address, birthday, gender, etc.) and classified the items into three categories: highly sensitive, sensitive, and basic disclosure. For each category, they examined how the number of disclosed items is correlated with intensity of their usage motives. According to a report by Stutzman et al. (2012), disclosure on Facebook is contributed to utilizing social capital in Facebook. They captured the degree of disclosure in Facebook through asking four questions such as "When I'm having a bad day, I post about it on Facebook" and "When I have an accomplishment I'm proud of, I share it on Facebook". Lai and Yang (2014) also used RSDS (Wheeless, 1978) for measuring self-disclosure of users in a Taiwan microblog service. They found that motivations for being popular and motivations for remaining friendships respectively have positive impact on self-disclosure.

Cultural Differences in Self-disclosure on Social Media

Previous work have been conducted in order to find out cultural differences in self-disclosure in Facebook (Krasnova et al., 2012; Reed et al., 2015, 2016). Krasnova et al. (2012) examine how self-disclosure (Krasnova et al., 2010) is influenced by perceived enjoyment (Krasnova et al., 2010; Nambisan and Baron, 2007), privacy concerns (Dinev and Hart, 2006), trust in the provider of Facebook (Mcknight et al., 2002), and trust in members on Facebook (Chiu et al., 2006; Malhotra et al., 2004) for U.S. users and German users. Although they did not clearly show cultural differences in self-disclosure, their results demonstrate that cultural backgrounds have an impact on how self-disclosure is correlated with privacy concerns, trust in Facebook provider, and trust in Facebook members. Reed et al. (2015) compare self-disclosure (behaviors related to users' privacy awareness such as changing a privacy setting to a higher one) of Facebook users by country. Firstly, they investigate the proportion of the users engaging in the self-disclosure according to the countries. Secondly, they map scores of gender egalitarianim, proposed by GLOBE (House and Javidan, 2004) that is a set of cultural indicators, to the each country. Their analysis indicates that the proportion of the self-disclosing users is negatively associated with the score of gender egalitarianim (Reed et al., 2015). Extending this research, Reed et al. (2016) further investigated the relationship of 30 countries between the proportion of the users engaging in the self-disclosure and social economics variables (e.g. HDI, GDP, female-to-male ratio, etc.). Among social economics variables, HDI was selected as the negatively significant variable.

User Motivations

Usage Objectives on Social Media

Researchers have been attracted to investigating the reason why people take part in social media (Joinson, 2008; Lampe et al., 2006; Java et al., 2007; Lin and Lu, 2011; Cheung et al., 2011; Peterson and Siek, 2009). Usage motives or objectives are known to be closely related to social capital on Twitter (Hofer and Aubert, 2013) or life satisfaction (Valenzuela et al., 2009). Also, motives or goals for using social media in the context of professional jobs (Donelan, 2016; Leftheriotis and Giannakos, 2014), sports events or fans (Stavros et al., 2014), or mental health (De Choudhury et al., 2014; Naslund et al., 2014) have been identified. Chen (2015) investigated why female bloggers used social media and identified three motives: (1) exchanging information, (2) having fun, and (3) making communication. According to Oh and Syn (2015)'s study revealing differences in usage motives across Facebook, Twitter, and other three social media, while social engagement was the primary motives for Facebook users, learning from others through information exchange was the dominant motives for Twitter users. Davenport et al. (2014) also compared how student and adults used Twitter and Facebook, and reported that students updated their profile pages to gain followers on Twitter, whereas adults edited profile pages to acquire friends on Facebook.

There exists some work to conduct a questionnaire survey to directly understand the reason why Twitter is used. Dimicco et al. (2008) investigate users' motivations for using social networking services

for the purpose of their business by interviews. According to their study, the reason why professionals use a social networking service is connecting to coworkers on a personal level, advancing their career, and campaigning for their projects. Through a qualitative study by Zhao and Rosson (2009), five usage objectives are found among Twitter users: (1) keeping in touch with friends and colleagues, (2) raising visibility of interesting things to one's social networks, (3) gathering useful information for one's profession or other personal interests, (4) seeking for helps and opinions, and (5) releasing emotional stress. Their investigation suggests that people take lower cost for interactions in Twitter than in other communication channels such as email, phone, or face-to-face conversation (Zhao and Rosson, 2009).

Cultural Differences in Usage Objectives on Social Media

Interaction or communication on social media differs by cultural backgrounds behind users (Fogg and Iizawa, 2008; Lewis and George, 2008). Various work have been conducted in order to understand motives or objectives using social media in terms of cultural differences. For instance, Jackson and Wang (2013) investigated differences in motivations for using social networking sites between U.S. and China, and found that U.S. people used social networking sites longer time and were likely to contact friends, meet new people, and obtain information than Chinese people. Cho and Park (2013) compared how people communicated on social media between Korea and U.S., and demonstrated that Korean people expected to share their daily lives with friends, while U.S. people tended to be satisfied with online relationships devoid of close interactions. According to the investigation on social media use related to body image (person's perception of the aesthetics or sexual attractiveness of their own body) for U.S. and Korean people (Lee et al., 2014), a motive to seek and maintain personal status by using social media was positively related to satisfaction with one's body image only for Korean people. Rui and Stefanone (2013) examined the relationship between usage of social media and culture from the viewpoint of selective self-presentation, and showed that U.S. users preferred to updating text-based posts, whereas Singaporean users were likely to share more photos. Trepte and Masur (2016) conducted an investigation to roughly understand how people in U.S., UK, Germany, Netherlands, and China use social media. Among several usage goals they prepared in advance for this investigation, a motive to make a chance for conversations was largely influenced by cultural difference; Chinese people preferred the motives the most, and Germany people were less likely to engage in this motivation than any other countries. Kim et al. (2011) conducted a questionnaire survey to measure motives for using social media of U.S. and Korean people. According to their results from principal component analysis, the most important motives for U.S. people is seeking friends (e.g. meeting new people, taking with people having the same interests) while Korean people give the most weight to seeking entertainment (e.g. forgetting about work or other things, relaxing). Vasalou et al. (2010) gathered Facebook users from U.S, U.K., Italy, Greece, and France, and found six types of usage motives though principal component analysis. Their statistical analysis on usage motives of these users demonstrates that cultural backgrounds are related to various types of usage objectives. However, it is also found that there exists no cultural differences in a usage objective of interacting with users' friends.

Anonymity Consciousness

To the best of our knowledge, there are no study to propose anonymity consciousness. Firstly we refer previous work on cultural differences in privacy concerns instead of anonymity consciousness. Next, previous work on anonymity on social media and the Web are introduced.

Cultural Differences in Privacy Concerns

Privacy concerns have been found to be related to cultural backgrounds (Bellman et al., 2004; Milberg et al., 2000; Harris Interactive, 1999). Researchers attemped to acquire general findings on cultural differences in privacy concerns; however reports of several studies are partly different. Milberg et al. (2000) and Bellman et al. (2004) used Hofstede's cultural values (Hofstede et al., 2010) consisting four indexes: *Power Distance Index* (PDI), *Individualism* (IDV), *Masculinity* (MAS), and *Uncertainly Avoidance Index* (UAI). Milberg et al. (2000) argued that IDV, PDI, and MAS are positively associated with privacy concerns. On the other hand, Bellman et al. (2004) stated that privacy concerns is associated with IDV and not associated with neither PDI nor MAS. The common claim from these studies (Bellman et al., 2004; Milberg et al., 2000) is that there exists a relationship between privacy concerns and IDV.

Anonymity on Social Media and the Web

Scholars who specialize in anonymity have conducted their studies about settings of privacy permissions for sharing their information (Patil and Lai, 2005; Tsai et al., 2009, 2010), or users' unwitting information

leaking (Ahern et al., 2007). They investigated how users control default setting of disclosing their personal information of MySpace (a browser-based interactive system for visualizing current locations of colleagues in workplace) users (Patil and Lai, 2005), Facebook users (Tsai et al., 2009), American Internet users (Tsai et al., 2010) or Flicker users (Ahern et al., 2007).

According to investigations or examination on the relationship between anonymity and age of people, young people were found to prefer being anonymous than adults (Rainie et al., 2013; Keipi et al., 2015). Being anonymous, people actively disclose themselves (Joinson, 2007), taking risks (Stuart et al., 2012), or revealing their thoughts and opinions strongly without caring of criticisms (Bargh et al., 2002; Zhang and Kizilcec, 2014). Kang et al. (2013, 2016) discussed tradeoffs of whether people used Internet as being anonymous or not. These survey reported the reasons why people aim to be anonymous. They identified the reasons such as to avoid hate people or criticisms, to feel free to express and share opinions, or to protect personal safety. Investigations on anonymous discussion on Facebook Confession Board showed that taboo topics such as sexual issues, mental problems, or death were discussed by people (Birnholtz et al., 2015). On Whisper, an anonymous social media, users were found to talk about meeting nearby people, confessing evil deeds, or sexual minority (Correa et al., 2015). Morio and Buchholz (2009) found that Japanese users were likely to prefer anonymous while participating Slashdot than U.S. users. Inspired by Marx (1999), Chen et al. (2016) suggested two types of anonymity, *Network Technical Anonymity* (attitudes of self-disclosure of personal information in social media) and *Network Perceived Anonymity* (perceptions of openness of identity on social media), and showed that both had significant impacts on self-disclosure of Chinese users on Sina Weibo. Peddinti et al. (2014) classify Twitter users into four levels of anonymity as to whether users publish their identifiable information (real name and URL link): highly identifiable, identifiable, partially anonymous, anonymous. They find out there is a correlation between the level of users' anonymity and the probability of the user links to users reporting sensitive contents such as pornography, gun, or marijuana. In other words, they discuss how sensitive contents Twitter users are interested in according to their types of self-disclosure.

Contributions of this study

The present study is different from the previous work reviewed in this section in that (1) we select Twitter for examining self-disclosure, (2) we examine the relationship of how self-disclosure is associated with usage objectives and anonymity consciousness, and (3) we compare the relationship by cultural backgrounds. Our results imply how Twitter users disclose themselves as balancing their usage objectives with anonymity consciousness according to cultural backgrounds. We believe that the results give insights to design communication platforms where it is easy for users to balance social benefits with privacy risks, or to support users for maximizing the benefits and minimizing the risks.

INVESTIGATION

Overview

To address RQ1–3, we conducted a self-developed questionnaire survey. We asked users whether or not they disclose each disclosure item. In order to capture users' usage objectives, we asked users how they engage in each objective and we represented it in a numerical value calculated from their responses to our questionnaire. As well as usage objectives, anonymity consciousness is measured from users' responses to our questionnaire and represented in a numerical value.

We used Amazon Mechanical Turk (MTurk) for U.S. and Indian users and Yahoo! Crowd Sourcing Service (YCSS) for Japanese users as a platform for conducting the questionnaire survey, because they are the most popular crowd sourcing services in each country. According to previous work conducting questionnaire on MTurk, over 90% of MTurk workers from U.S. and India were found to use social media (Kang et al., 2014). Compared to MTurk, YCSS is more domestic because the service is only for Japanese people. According to the report about this service, it has 210 thousands workers (Nakayama, 2014). Among the user, 57% are male and 43% are female (Nakayama, 2014). Few research have revealed characteristic of tasks or workers in YCSS; however we believe this is the major crowd source service in Japan at this stage.

As suggested by Paolacci and Chandler (2014) or Goodman and Paolacci (2014), we need some extra cares when conducting questionnaires on Amazon Mechanical Turk. In this investigation, we tried to tackle the below issues to get reliable data: (1) how to set reward price, (2) how to filter inconsistent subjects, and (3) how to avoid double answers. Firstly, as Goodman and Paolacci (2014) proposed the minimum reward

Table 1. Differences in individualism/collectivism, ethnic variety, and economic growth of U.S., India, and Japan

country	individualism/collectivism	ethnic variety	economic growth
U.S.	individualism	higher	developed
India	collectivism	higher	developing
Japan	collectivism	lower	developed

for U.S. and India samples as 7.25 dollars and 0.92 dollars per hour respectively and our questionnaire takes approximately 20 minutes, thus we set the reward as 5 dollars for U.S. subjects and 1 dollar for Indian subjects as it satisfies the minimum requirements. Second, our questionnaire automatically checked inconsistency of subjects' answers, and excluded subjects if they gave us inconsistent answers. For instance, if they answered "I posted tweets to communicate with others five days in the last week" in a question though they answered "In total, I posted tweets two days in the last week" in another question, we excluded the users because their answers were inconsistent. Third, we excluded answers from the same workers. Additionally, we asked subjects to give screen names of their Twitter accounts. We recruited coders and asked them to check whether different subjects with same Twitter accounts existed by accessing subjects' Twitter pages, but they reported there were no same accounts.

The surveys were conducted separately for Americans and Indian during January 26th–28th, 2016, and for Japanese during May 1st–14th, 2015. For gathering active users, we imposed conditions that users have to start following someone additionally in the past month and had to post at least one tweet in the past week in order to participate in our survey. Also, we asked users about their basic demographic information such as gender, age, and occupation. When users completed our survey, we paid rewards 1.5 dollars to Japanese users, 5 dollars to U.S., and 1 dollar to Indian users. The questions in our questionnaire were made in Japanese first, then translated into English with English proofreading. Also, the research team include native speakers of each language as well as bilingual researcher; special care was to address equivalence, focused on the scenarios and colloquial usages.

This research was reviewed by the University of Minnesota Research Subjects Protection Program (IRB) and determined to be exempt from full review under 45 CFR Part 46.101(b) category #2.

Why United States, India, and Japan?

Comparing U.S. and Japan, we can find several important differences. In terms of ethnic variety, U.S. is a multi-ethnic country and Japan is a racial homogeneous country. In general, U.S. has a culture of individualism (Hofstede, 1984, 2016). On the contrary, Japan is characterized as collectivism nation (Hofstede, 1984, 2016), where people give more weight to group harmony and consensus than individual achievements (Hall and Hall, 1989). According to the previous work on self-disclosure, cultural difference between individualism and collectivism was found to have an impact on attitudes of self-disclosure (Chen, 1995; Asai and Barnlund, 1998; Ting-Toomey, 1991; Barnlund, 1989).

As well as Japan, India is also regarded as collectivism country (Hofstede, 1984, 2016). Compared to U.S. and Japan, the economy in India has been rapidly growing recently (World Bank, 2015). According to Reed et al. (2016), among demographic features, Human Development Index (HDI) was found to be the strongest variable to predict the fraction of self-disclosing users in 30 countries. HDI represents a composite statistic of life expectancy, education, and per capita income indicators. Therefore self-disclosure is possibly associated with the growth of the countries' economy.

In addition, India has a wide ethnic variety inside the country. In our idea, in a society with higher ethnic variety such as U.S. or India, people have a lot of chance to communicate with others having various ethnic backgrounds. Compared to this, people in a society of lower ethnic variety such as Japan mainly communicate with similar ethnic backgrounds. Therefore, we think that people in higher ethnic variety are less likely to feel threats or anxiety about self-disclosure than people in lower ethnic variety, because people in high ethnic variety might be more used to strangers than people in low ethnic variety.

To sum up, we believe that it is worth comparing self-disclosure of people in U.S., India, and Japan because they show wide differences in individualism/collectivism, ethnic variety, and economic growth as shown in Table 1. Therefore we chose these three countries for this study.

Researchers have discussed whether difference in countries represents difference in culture (Tung, 2008; House et al., 2010; Reagon, 2013). This differs by country; however we selected U.S., India, and
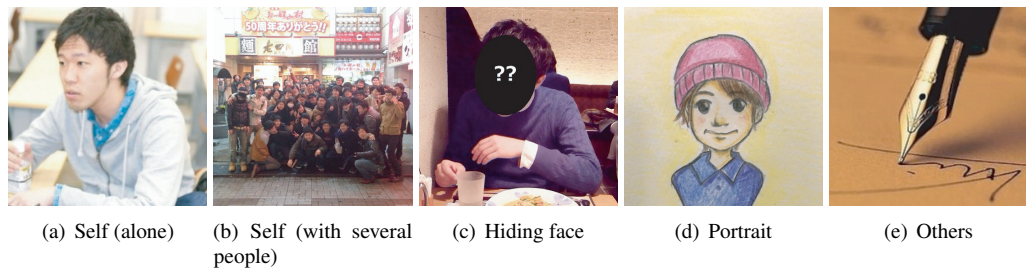
| (a) Self (alone) | (b) Self (with several people) | (c) Hiding face | (d) Portrait | (e) Others |

Figure 2. Categories and examples of profile images

Japan, that shows distinctive culture respectively. We believe that differences in these three countries are consistent with the cultural differences. Previous work also provided adequate insights of cultural differences in self-disclosure comparing users in different countries (Asai and Barnlund, 1998; Chen, 1995; Krasnova et al., 2012; Reed et al., 2016).

Self-disclosure in Twitter Profiles

In this part, we ask users about what kind of personal information they write in their profiles. The questions are shown below.

Name: *Which do you use as your account name?* 1. Real name (both first name and last name), 2. Part of real name (either first name or last name) (e.g. Michael, Robert), 3. Nickname based on real name or abbreviation of real name (e.g. Micky, Rob), 4. Others.

In this study, if a user answers 1 or 2, we regard the user as disclosing his/her real name.

Face: *Which kind of pictures or portraits do you use as your profile image?* 1. Self (alone): a photo of the owner, 2. Self (with several people): a photo of the owner including the user's friend(s), 3. Hiding face: a photo of the owner but the face is hidden by his/her arm, painting, shadow, or an object, 4. Portrait: a portrait picture of the owner, 5. Others.

Figure 2 shows examples of the picture types. In this study, if a user answers 1 or 2, we regard the user as disclosing his/her real face. If a user has never uploaded profile images or sets the default image, the user is regarded as not disclosing the face.

Self description: *Which attributes do you write in your profile text?* 1. Living place, 2. Belonging organizations or affiliations, 3. Link of the user's web page (or the web page of the belonging organization or affiliation), 4. Details about hobbies, works, careers, etc., 5. Nothing.

This is a multiple-choice question. In a case that a user selects 1 and 3, we regard the user as disclosing his/her living place and a link to his/her web page.

Usage Objectives on Twitter

Approach

Table 2 shows correspondence of usage objectives with basic actions –"follow" and "post"– and examples of actual behaviors. In this study, "post" means not only posting an original tweet but also replying to others, sending direct messages, or retweeting others' tweets.

We observe users' usage objectives by asking users about how often and for what kind of purposes they perform these actions. Specifically, we ask users how many users they started following additionally in the past month and how many days they posted in the past week according to each type of usage objectives. In general, a frequency of posting tweets is higher than that of starting following others. Considering the frequency issue, we ask users about their following actions in the past month and posting actions in the past week. The answers for these questions are formed in a scale of five levels.

Questions

Table 3 shows the questions we used in this survey. Due to the limitation of writing space, we show only gerunds of usage objectives corresponding to each question. In the right column in Table 3, we also

Table 2. Usage objectives in this study

Code	Type of usage objective	Action	Example of actual behaviors
Ke	Keeping in touch with others	Follow, Post	Following classmates, Replying to the friends' updates
Ga	Gathering useful information	Follow	Following accounts of updating news, articles, etc.
Ra	Raising visibility of interesting things to others	Post	Posting a tweet about topical news articles, funny things in a daily life
Re	Releasing stress	Post	Posting a tweet about anxiety for term tests
Se	Seeking for helps and opinions	Post	Posting a tweet asking for direction to a restaurant, asking for a help to make a registration on the Web
Ad	Advertising what they have done	Post	Posting a tweet about a paper acceptance, a win in a tournament

Note: Code is used for simply representing usage objectives. Actions mean user actions on Twitter according to each type of usage objectives. Examples of actual behaviors show some actions for achieving each type of usage objectives.

present the usage objectives and the codes (given in Table 2) measured by each question. Most of the questions intend to ask the frequency of actions for a specific purpose. We prepare two questions that ask the basic frequency of actions (follow and post) without considering any specific purpose (question #1 and #4 in Table 3). This helps users to answer the other questions. We show the formulas for transferring users' response into five levels.

$$
Ans_i^F = \begin{cases} 1 & (answer_i^F = \text{``0''}) \\ 2 & (answer_i^F = \text{``1 } or \text{ 2''}) \\ 3 & (answer_i^F = \text{``3 } or \text{ 4''}) \qquad i \in \{Ke, Ga\} \\ 4 & (answer_i^F = \text{``from 5 to 7''}) \\ 5 & (answer_i^F = \text{``8 } or \text{ more''}) \end{cases} \tag{1}
$$

$$
Ans_j^P = \begin{cases} 1 & (answer_j^P = \text{``0''}) \\ 2 & (answer_j^P = \text{``1''}) \\ 3 & (answer_j^P = \text{``2 } or \text{ 3''}) \quad j \in \{Ke, Ra, Re, Se, Ad\} \\ 4 & (answer_j^P = \text{``4 } or \text{ 5''}) \\ 5 & (answer_j^P = \text{``6 } or \text{ 7''}) \end{cases} \tag{2}
$$

In these equations, i and j represent the codes of usage objectives defined in Table 2. Here, Ans_i^F and Ans_j^P are respectively related to following actions (question #2 and #3 in Table 3) and posting actions (question #5 or later in Table 3). Also, $answer_i^F$ and $answer_j^P$ corresponds to the answers for following actions and for posting actions, shown in Table 3. Using these formulas, we calculate users' scores of each type of usage objectives as below.

$$
UO_i = \begin{cases} (Ans_i^F + Ans_i^P)/2 & (i = Ke) \\ Ans_i^F & (i = Ga) \quad i \in \{Ke, Ga, Ra, Re, Se, Ad\} \\ Ans_i^P & (others) \end{cases} \tag{3}
$$

The score means a frequency-based scale of usage objective i considering users' following and posting actions. We set two questions (question #2 and #5 in Table 3) for the usage objective of "keeping in touch with others". This is because it is general that users start following other users additionally for contacting with their friends or post tweets for communicating with their followers such as replying or sending direct messages. Therefore a score for this usage objective is an average of answers for these two questions.

Additionally, we ask users about target audiences when they perform these actions according to each type of usage objective. Table 4 shows the definitions of target audiences. In "following" activities (question #1–#3 in Table 3), corresponding audiences are target audience #1, #2, #4 or later in Table 4.

Table 3. Questions and answer options for usage objectives

#	Question	Answer option	Usage objective (code)
1	How many users did you start following additionally in the past month?	0; 1 or 2; from 3 to 5; from 6 to 9; 10 or more	-
2	Among the users you answered in #1, how many users did you start following primarily to communicate with?	0; 1 or 2; 3 or 4; from 5 to 7; 8 or more	Keeping (Ke)
3	Among the users you answered in #1, how many users did you start following primarily as a source of interesting information?	0; 1 or 2; 3 or 4; from 5 to 7; 8 or more	Gathering (Ga)
4	How many days did you post a tweet or tweets in the past week?	0; 1; 2 or 3; 4 or 5; 6 or 7	-
5	Among the days you posted tweets in #4, how many days did you post a tweet or tweets to communicate with other users?	0; 1; 2 or 3; 4 or 5; 6 or 7	Keeping (Ke)
6	Among the days you posted tweets in #4, how many days did you post a tweet or tweets to show interesting things to other users?	0; 1; 2 or 3; 4 or 5; 6 or 7	Raising (Ra)
7	Among the days you posted tweets in #4, how many days did you post a tweet or tweets to seek for helps or opinions?	0; 1; 2 or 3; 4 or 5; 6 or 7	Seeking (Se)
8	Among the days you posted tweets in #4, how many days did you post a tweet or tweets to release your emotional stress?	0; 1; 2 or 3; 4 or 5; 6 or 7	Releasing (Re)
9	Among the days you posted tweets in #4, how many days did you post a tweet or tweets to advertise what you have done?	0; 1; 2 or 3; 4 or 5; 6 or 7	Advertising (Ad)

Note: Answer options are used as the choices for each question. Types of usage objectives and the code measured by each question are shown in the right column.

The reason why target audience #3 is inappropriate for the activities is that we cannot regard those who have not met as friends. In "posting" activities (question #4 or later in Table 3), target audience #3 is appropriate instead of target audience #4 in following activities.

Anonymity Consciousness

Approach

Anonymity consciousness refers to intention of information providers to avoid being identified and reached by strangers when the providers engage in public spaces. It can be found both offline and online. Moreover, it does not depend on rewards or benefits in compensation for delivering personal information.

To make questions for measuring anonymity consciousness, we assume curbside interviews as a situation where people are spoken to by strangers and asked to provide their personal information. Other than curbside interviews, there are several examples of the situation where people are interacted with by strangers such as social parties, academic conferences, or online dating sites. Certainly, anonymity consciousness may exist in these situations; however, they engage in these situations in order to gain benefits such as human connections, jobs, or love. To measure anonymity consciousness, we aim to exclude the effects of motives of gaining benefits, because anonymity consciousness does not depend on the motives. Curbside interviews is a typical situation in which a subject is spoken to by strangers (interviewers). Participation in curbside interviews is voluntary and has nothing to do with direct benefits. Therefore, we adopt curbside interviews as a supposed situation in our questions for measuring anonymity consciousness.

Table 4. Target audiences when users start following others additionally or post tweets

#	Audience	Definition
1	Family	People with blood relationship, such as your brothers, sisters, siblings, parents, children, cousins, etc
2	Real-world friends	Friends you know and meet in the real world
3	Cyber-world friends	Friends you know only online (you do not know them in the real-world) and have connections only online (other than accounts of a celebrity, a company, an enterprise)
4	Promising cyber-world friends	Candidates of "cyber-world friends". You have not followed them yet, but you want to start following them because they may have common hobbies or favorite things with you
5	Celebrities	Celebrities such as TV talents, actors, singers, scholars, entrepreneurs, etc
6	Companies or enterprises	Representative accounts of a company or an enterprise
7	Business colleagues	People you know primarily from your work (may be at your company, at other companies you interact with, or otherwise related to work activities)
8	Others/Public	People you don't know (other than above categories)

Questions

The upper half of Table 5 shows situations for observing anonymity consciousness. We propose five situations, which does not depend on rewards or benefits. As shown in the lower half, questions ask users how tolerate they are when they are asked to provide their name, e-mail address, and face (photo) in each situation. Alternatively, we could have used other personal information such as living places or personal preferences. We actually used name, e-mail address, and photo because these are information that are commonly needed in a lot of cases where people give personal information such as creating SNS accounts, registering e-commerce sites, or making drivers' cards. From the design of this questionnaire, we cannot discuss how tolerate people are when being asked to give other personal information; however we believe that the questions include enough personal information to get anonymity consciousness in general. To these questions, we prepare 3-scale options as answers representing strongly reject, reject, and unconcern.

We define intensity of anonymity consciousness as *AC*, which is calculated by summing up the levels corresponding to all the user's answers (options for the questionnaire); therefore it ranges from 15 to 45. The options for answers and the corresponding levels are shown in the lower half of Table 5. It is regarded as the level of anonymity consciousness of each user. The higher it is, the stronger anonymity consciousness the user has.

DATA VALIDATION

Through our questionnaire, 105 U.S. users, 108 Indian users, and 109 Japanese users are gathered. For data collected by our questionnaire, we need to validate (1) if our participants represents a general sample of Twitter users and (2) if participants' responses to our questionnaire are reliable.

To validate (1), we compare self-disclosure of the participants with that of general Twitter users. To validate (2), we check consistency between participants' responses about self-disclosure or usage objectives and their actual self-disclosure in Twitter profiles or usage on Twitter. In our questionnaire, we ask users to provide us with their Twitter handle names. Using the handle names, we obtain participants' user names, profile photos, self-descriptions, and tweets in the period when we'd conducted our survey by Twitter REST API. These information is used for validation (2). Furthermore, we check Cronbach's α coefficient for their responses about anonymity consciousness.

Participants

The distributions of participants' age and gender are shown in Table 6. In every country, the number of male is larger than that of female. With respect to age, the numbers of 20s and 30s are the largest groups in all countries. Compared to Japan, there are fewer participants in older groups such as 50s and 60s in

Table 5. Situations, questions, and answers for asking users about their anonymity consciousness

#	Situation
1	When you walked in a town and were asked to answer a paper-based questionnaire by an officer from a public institution
2	When you walked in a town and were asked to answer a paper-based interview regarding a marketing survey for a development of new products conducted by a company you don't know
3	When you walked in a town and were asked to answer a paper-based interview regarding a marketing survey for a development of new products conducted by a company you know
4	When you walked in a town and were asked to answer a paper-based interview conducted by a journal or a newspaper you don't know
5	When you walked in a town and were asked to answer a paper-based interview conducted by a journal or a newspaper you know

#	Question	Answer option (score)
1	What would you think if you were asked to provide your name?	Wouldn't mind providing it (1); Wouldn't want to provide it if possible (2); Wouldn't want to provide it (3)
2	What would you think if you were asked to provide your e-mail address?	Wouldn't mind providing it (1); Wouldn't want to provide it if possible (2); Wouldn't want to provide it (3)
3	What would you think if the person asked if he or she could photograph you?	Wouldn't mind being photographed (1); Wouldn't want to be photographed if possible (2); Wouldn't want to be photographed (3)

Table 6. Age and gender distribution (U.S. and Indian users are gathered from MTurk, and Japanese users are gathered from YCSS)

	U.S.		India		Japan	
	N	%	N	%	N	%
Total	105	–	108	–	109	–
Age						
–19	2	1.9	1	1.0	5	4.6
20–29	56	53.3	59	54.6	31	28.4
30–39	38	36.2	35	32.4	34	31.2
40–49	9	8.4	7	6.5	27	24.8
50–59	0	0.0	2	1.9	10	9.2
60–	0	0.0	4	3.7	2	1.8
Gender						
Male	67	63.8	87	80.6	59	54.1
Female	38	36.2	21	19.4	50	45.9

U.S. and India, but the age-distributions of participants in each country are approximately same.

Validation for Generality of Participants

The reason behind using crowd sourcing services is to minimize participants' demographic deviations. However, it is unknown whether a set of the participants is a representative general sample of Twitter users in terms of self-disclosure. Thereupon, we compare self-disclosure of general Twitter users with that of the participants, and verify if the participants are representative of general Twitter users.

First, using Twitter sample API, we gathered general Twitter users from U.S., India, and Japan during a week of 2015.12.10 – 2015.12.17. We identify their countries based on time zones and places basically attached to tweets (e.g. "(GMT+09:00) Tokyo"). As a result, 1,031,938 U.S. users, 28,572 Indian users, and 336,293 Japanese users were gathered as unique users. From the large pool of the unique users in each country, we randomly picked up 100 users respectively. We call them target users.

Next, we invite three coders and ask them to code whether the target users disclose or do not disclose their real name, real face, place, affiliation, web-page link, and details about their hobby or work. Also, we ask the coders to evaluate (A) if a target user automatically post tweets, (B) if a target user is a

Table 7. Average numbers of disclosing items per user of the participants and general Twitter users

	U.S.	India	Japan
Our participants	2.143	2.194	1.138
General Twitter users	2.000	2.291	1.598

representative account of a organization or a social group, and (C) if a target user is not from U.S., India, or Japan. If a target user meets one of the conditions (A), (B), or (C), we exclude them for this investigation. Finally, 77 U.S. users, 79 Indian users, and 87 Japanese users are left. Here, let an inter-coder concordance rate according to the specific disclosure item *item* be r_{item}. The average of r_{item} is respectively 0.88 in U.S., 0.91 in India, and 0.91 in Japan.

Based on majority decision of the coders, we calculate how many disclosure items the target users disclose. As well as the target users, we also calculate how many disclosure items our participants disclose. The results are summarized in Table 7.

In both samples of our participants and general Twitter users, the rankings of average numbers of disclosure items per user are same: the first is India, the second is U.S., and the third is Japan. It can be said that the participants we gathered on crowd sourcing services substantially represent cultural differences in self-disclosure of general Twitter users.

For Japanese users, general Twitter users are relatively active to disclose themselves than the participants. In particular, we found that general Twitter users in Japan are more likely to disclose details about their hobby or work (65.5%). As we used Twitter sample API, there is possibility that we collected users who actively post tweets. It is indicated that users who post tweets actively tend to publish details about their hobby or work, and that they might deliver their interests or preferences via tweets.

Validation for Reliability of Participants' Response
Validation for Self-disclosure in Twitter Profiles
Firstly, for each country, we randomly pick up 20 users as target users for this validation from the participants of our questionnaire survey.

Second, we invite three coders. In our questionnaire, we asked participants to submit their Twitter ID, that is, screen names. For validation for self-disclosure in Twitter profiles, we asked coders to access Twitter profile pages of the target users via the screen names. The coders are asked to check whether the target users actually disclose the six disclosure items: (1) their real name, (2) their real face, (3) place they live in, (4) affiliation they belong to, (5) link to their web page, and (6) details about their work or hobby. As a result, the average of inter-coder concordance rate r_{item} is 0.93 in U.S., 0.96 in India, 0.91 in Japan.

Based on majority decision of three coders, we decide whether target users actually disclose a specific item and define it as profile-based disclosure. We then check the concordance between self-reported disclosure and profile-based disclosure for all disclosure items. Here, let the concordance rate according to the specific disclosure item *item* be c_{item}.

The average of c_{item} of Indian users is 0.68. The rate of Japanese users is 0.77, and that of U.S. users is 0.81. The reason why the rate of Indian users is relatively low is that some Indian users answer "I don't disclose my face or place" but the coders evaluate them "they disclose their face or place". When we check r_{name} and r_{place} of Indian users, both of them are 0.97 respectively. Considering it, we conclude some Indian users might hesitate to tell us their personal information. Though, even if they provided us with correct answers, our conclusion in this paper would not be significantly changed because this paper shows that India has the largest number of users who disclose themselves.

Validation for Usage Objectives on Twitter
For this coding, we obtained the tweets of the targets users in advance using Twitter REST API. We select users who posted at least 20 tweets in the period when our questionnaire was conducted, and who did not post same tweets in order to exclude automatic posting accounts. Among those users, we randomly picked up 20 users as target users for this validation. Tweets posted by the target users in the period are called a tweet set in this paper.

In this study, posting action is not used for measuring a usage objective of gathering useful information. We capture the usage objective from users' following action; however it is impossible for a third person to know when users started following other users. We cannot detect when users additionally follow others

during the implementation period of our questionnaire survey. Therefore, for this validation, we focus on usage objectives of keeping in touch with others, raising visibility, releasing stress, seeking for help, and advertising yourself.

We invited three coders. The coders are asked to see participants' tweet sets. Tweets in the tweet sets are aligned by the day when it was posted. We ask the coders to check daily tweets, and infer, at most, top three types of the usage objectives (for example, if a participant posted tweets for five days, this process is repeated at five times). For each type of usage objectives, we examine inter-coder concordance rates in terms of whether the coders rank the usage objective as one of the top three. As a result, the average rate is 0.81 for U.S., 0.84 for India, and 0.77 for Japan.

Based on majority decision, we count how many days target users posted tweets for a specific usage objective. Here, we define the count as n_i where i represents a usage objective. We transferred n_i into d_i as follows to map n_i into five levels.

$$d_i \;=\; \begin{cases} 1 & (n_i = \text{``0''}) \\ 2 & (n_i = \text{``1''}) \\ 3 & (n_i = \text{``2 or 3''}) \quad i \in \{Ke, Ra, Re, Se, Ad\} \\ 4 & (n_i = \text{``4 or 5''}) \\ 5 & (n_i = \text{``6 or 7''}) \end{cases} \tag{4}$$

Using d_i, we calculate intensity of tweet-based usage objectives uo_i^{tb} as follows. It represents the intensity of usage objective i estimated from tweets.

$$uo_i^{tb} \;=\; \frac{d_i}{\sum_j d_j} \quad i, j \in \{Ke, Ra, Re, Se, Ad\} \tag{5}$$

Next, using Ans_i^P (in equation 2), we calculate intensity of self-reported usage objectives uo_i^{sr} as follows. Thus, uo_i^{sr} is the intensity of a usage objective i based on participants' responses.

$$uo_i^{sr} \;=\; \frac{Ans_i^P}{\sum_j Ans_j^P} \quad i, j \in \{Ke, Ra, Re, Se, Ad\} \tag{6}$$

To evaluate reliability of self-reported usage objectives, we calculate a cosine similarity between uo_i^{sr} and uo_i^{tb} for all usage objectives. As a result, the user-average score of the similarity is 0.90 in U.S., 0.92 in India, and 0.92 in Japan. It can be said that participants' answers on usage objectives are substantially reliable.

Validation for Anonymity Consciousness

We developed a questionnaire for anonymity consciousness. To check whether anonymity consciousness is reliable as a psychological measure, we use Cronbach's α coefficients. In general, if the coefficient is larger than 0.80, the psychological measure is reliable. As a result of this test, the coefficient in U.S., India, and Japan is respectively 0.92, 0.87, and 0.93.

RESULTS & IMPLICATIONS

In this section, we show our analysis results about research questions RQ1–3. We use all data gathered through our questionnaire survey.

Cultural Differences in Self-disclosure, Usage Objectives, & Anonymity Consciousness

RQ1 is "*to what extent are self-disclosure, usage objectives, and anonymity consciousness respectively different in the United States, India, and Japan?*". Here, we show our results on this research question.

Cultural Differences in Self-disclosure in Twitter Profiles

Based on users' responses to our questionnaire, we count how many users disclose each disclosure item and calculate the ratio of users disclosing the disclosure item. In every disclosure item, we conduct a Bonferroni multiple comparison in order to verify if the ratio of self-disclosing users is different by country. Figure 3 shows the ratio in each country and the results by the multiple comparison.

Regarding name, face, place, affiliation, and link, we find disclosing these items is associated with cultural backgrounds. In all of these items, Indian users are more likely to disclose the items than Japanese
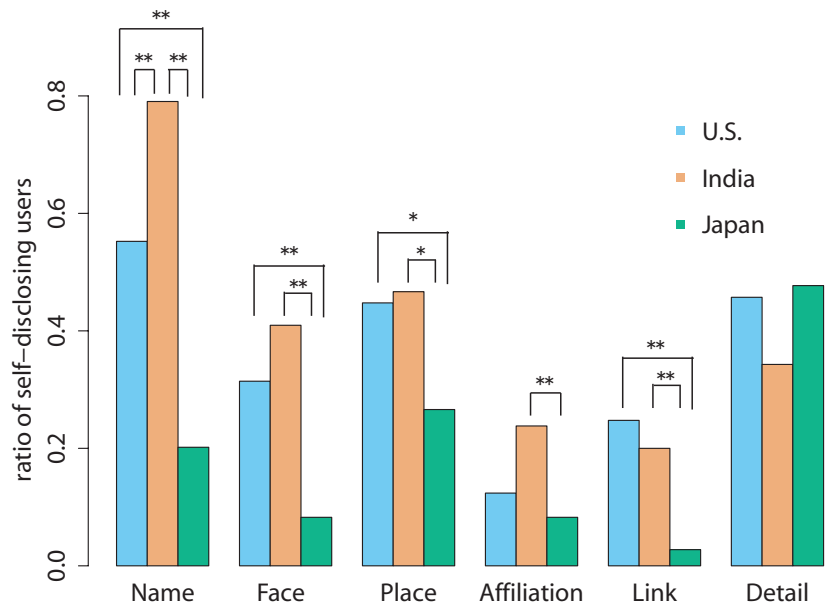
Figure 3. The ratio of users disclosing each disclosure item in U.S., India, and Japan (the results using a Bonferroni multiple comparison are represented in asterisk marks (*...$p < 0.05$, **...$p < 0.01$))

users (name, face, affiliation, and link: $p < 0.01$, place: $p < 0.05$). With regard to disclosing real name, the ratio of Indian users is found to be higher than that of U.S. users ($p < 0.01$). Among users disclosing their real name (either first name or last name), we find 64 Indian users (59.2% (64/108)), 31 U.S. users (29.5% (31/105)), and 5 Japanese users (4.6% (5/109)) disclose their complete name, i.e. both of first name and last name. Although we do not find statistically significant differences, the ratio of Indian users disclosing name, face, place, and affiliation is respectively higher than U.S. users.

Compared to Japanese users, U.S. users are more likely to disclose their name ($p < 0.01$), face ($p < 0.01$), place ($p < 0.05$), and link ($p < 0.01$) in Twitter profiles. This finding on the differences in self-disclosure between U.S. and Japan is consistent with previous work that indicate that individualism people are more positive to disclose themselves than collectivism people (Asai and Barnlund, 1998; Chen, 1995; Krasnova et al., 2012; Nakanishi, 1986). Among Japanese users, the ratio of users disclosing their detail (47.7% (52/109)) is relatively higher than that of users disclosing their name (20.2% (22/109)), face (8.3% (9/109)), place (26.6% (29/109)), affiliation (8.3% (9/109)), and link (2.8% (3/109)). It implies that Japanese users prefer disclosing information by which it is difficult for others to identify the user rather than personally identifiable information such as their name, face, place, affiliation, or link.

Summarizing these results, it can be understood that Indian users are more active to disclose themselves in Twitter profiles than U.S. and Japanese users. According to individualism index by Hofstede Cultural Dimension Scores (Hofstede, 2016), India and Japan are characterized as a collectivism country. Previous work support that people in individualism culture are more active to disclose themselves than people in collectivism culture (Asai and Barnlund, 1998; Chen, 1995; Nakanishi, 1986; Krasnova et al., 2012). Our result indicates that self-disclosure varies among countries with collectivism culture, and that individualistic people are not necessary active for self-disclosure compared to collectivistic people. It is interesting that our finding that Indian users prefer disclosing themselves is not consistent with the previous work.

To date, previous work target two countries such as U.S. and Japanese (Asai and Barnlund, 1998; Nakanishi, 1986), Chinese (Chen, 1995), or Germany (Krasnova et al., 2012) for cultural comparison of self-disclosure. According to Kumaraguru and Cranor (2005), because of Indian tradition of joint family, it is typical for Indian people to share personal information such as personal financial information with members of their large extended family. Examining target audiences of Indian users when they engage in every type of usage objectives, we found that "family" is the second dominant audience when keeping in touch with others (44/108), raising visibility (46/108), releasing stress (40/108), seeking for help (39/108),

Table 8. Statistics of intensity of each type of usage objective, and t-value by steel-dwass test for uo_i across every pair of U.S. (US), India (IN), and Japan (JP)

Usage objectives	U.S. (105)		India (108)		Japan (109)		t-value by steel-dwass test		
	M.	S.D.	M.	S.D.	M.	S.D.	US–IN	US–JP	IN–JP
uo_{Ke}	0.172	0.046	0.177	0.035	0.180	0.062	0.264	0.881	0.289
uo_{Ga}	0.234	0.069	0.179	0.061	0.200	0.078	6.107**	3.369**	2.065
uo_{Ra}	0.215	0.059	0.184	0.040	0.198	0.085	4.660**	2.521*	0.087
uo_{Re}	0.137	0.051	0.157	0.039	0.150	0.063	3.491**	1.381	2.187
uo_{Se}	0.115	0.037	0.156	0.036	0.124	0.052	7.391**	1.250	6.275**
uo_{Ad}	0.127	0.050	0.146	0.041	0.148	0.075	3.426**	1.883	1.333

Note: M. and S.D. respectively stands for mean and standard deviation. $*...p < 0.05$, $**...p < 0.01$

and advertising yourself (47/108). It can be said that they tend to connect with their family members on Twitter. Thus, they may not be resistant to disclose themselves to a wider group of people on Twitter due to the custom of sharing information with members of their joint family.

We also find U.S. users generally tend to disclose more personal information than Japanese users. This finding can be explained by previous work (Asai and Barnlund, 1998; Nakanishi, 1986). Our results demonstrate that the cultural index of individualism/collectivism is able to explain differences in self-disclosure between U.S. and Japan; however it cannot explain why Indian users are more likely to disclose themselves than U.S. or Japanese users. We emphasize that the individualism/collectivism index might not be able to aptly explain cultural differences in self-disclosure.

Cultural Differences in Usage Objectives on Twitter

We calculate intensity of usage objectives uo_i as follows for all users. UO_i is defined in the equation (3). This measurement uo_i implies the extent of weight users give to a usage objective i among the six usage objectives.

$$uo_i \quad = \quad \frac{UO_i}{\sum_j UO_j} \quad i, j \in \{Ke, Ga, Ra, Re, Se, Ad\} \tag{7}$$

After calculating uo_i for all users, we compare distributions of uo_i by the countries. In order to do this, we conduct steel-dwass test, a multiple comparison that assesses differences in distributions across every pair of two groups among three or more groups, for the distributions of uo_i across U.S., India, and Japan. Table 8 shows statistics of the intensity of each type of usage objectives in each country. Also, t-values and p-values calculated by the statistical analysis across every pair of the three countries are represented. The larger t-value represents a greater difference across the pair.

We find that U.S. users tend to engage in gathering useful information than Indian and Japanese users do (uo_{Ga}: U.S. vs India ... $t = 6.107$ ($p < 0.01$), U.S. vs Japan ... $t = 3.369$ ($p < 0.01$)). Also, compared to Indian and Japanese users, U.S. users are likely to give more weight to raising visibility of interesting things (uo_{Ra}: U.S. vs India ... $t = 4.660$ ($p < 0.01$), U.S. vs Japan ... $t = 2.521$ ($p < 0.05$)). In all countries, it can be seen that the mean intensity of these usage objectives are the first or the second highest. Consistent with conventional reports (Kwak et al., 2010; Wu et al., 2011), our findings imply that Twitter is primarily used as sending and receiving information about their interest or preference. Among the three countries, people in U.S. are found to post tweets and start following other users more frequently for these usage objectives.

There are no significant differences in the intensity of the usage objective of keeping in touch with others across user groups of the three countries. It means U.S., Indian, and Japanese users give weight to this usage objective to the same extent. This is consistent with the previous work (Vasalou et al., 2010), which report that cultural differences have no impact on a usage objective of interacting with users' friends.

Indian users are more likely to release stress and seek for help or opinions than U.S. users. With respect to seeking for help, Indian users tend to engage in this usage objective more than Japanese users. According to investigation on users' behaviors related to Q&A on SNS (Yang et al., 2011), Asian users are more likely to ask questions on SNS than Western users. Our finding about cultural differences in seeking for help and opinions between U.S. and India might follow the finding of the previous report. The

Table 9. Statistics of intensity of anonymity consciousness, and t-value by steel-dwass test for *AC* across every pair of U.S., Indian, and Japanese users

Anonymity consciousness	U.S. (105)		India (108)		Japan (109)		t-value by steel-dwass test		
	M.	S.D.	M.	S.D.	M.	S.D.	US–IN	US–JP	IN–JP
AC	30.86	8.263	26.94	6.644	34.83	6.272	3.377**	3.543**	7.828**

Note: M. and S.D. respectively stands for mean and standard deviation. $^*...p < 0.05$, $^{**}...p < 0.01$

reason why Indian users prefer releasing stress more than U.S. users cannot be understood at this stage; therefore addressing this issue is our future work.

We found that Indian users are more likely to advertise themselves on Twitter than U.S. users are. According to Hofstede (2016), Indian people have an aspect of visually displaying their success and power. Similarly to this, U.S. people also prefer talking freely about their success and achievements in life. For U.S. people, not "being successful" but "being able to show one's success" is the great motivation in their country (Hofstede, 2016). People in both countries have motives for being successful and showing their achievements; however we cannot clarify the reason why Indian people are more actively engage in advertising themselves than U.S. users. This is our future issue. Turning now to Japanese users, we found that they are not significantly different in advertising themselves from U.S. and Indian users. As well as U.S. and India, Japan is also the country where the society is driven by achievements or success; however they are different from U.S. and Indian people in that they prefer competition between not individuals but groups (Hofstede, 2016). The reason behind no significant differences in intensity of this usage objective between Japan and the other countries cannot be well understood at this stage. Considering that the standard deviation of uo_{Ad} of Japanese users is larger than the other countries, one conjecture regarding the above result might be that the intensity of this usage objective varies more widely among Japanese users. We have to more minutely investigate advertising behaviors of Japanese users in the future work.

Cultural Differences in Anonymity Consciousness

As explained before, we measure intensity of anonymity consciousness *AC* from users' responses to our questionnaire. As well as intensity of the usage objectives, we conduct a steel-dwass test for *AC* across user groups of the three countries. This result is shown in Table 9.

It is found that there are statistically significant differences in *AC* in all pairs of the three countries ($M = 30.86$ (U.S.), 26.94 (India), 34.83 (Japan), $p < 0.01$ respectively). It can be concluded that Indian users are more likely to have weaker anonymity consciousness than U.S. users, and that U.S. users are more likely to have weaker anonymity consciousness than Japanese users. According to a conventional report about privacy concerns (Maynard and Taylor, 1996), it is indicated that Japanese people express stronger concerns about their privacy than U.S. people. We believe that this cultural differences also emerge in differences in anonymity consciousness between U.S. and Japanese users. In India, there had not been governmental laws about privacy policies for personal data protection. In the last few years, as the number of companies from foreign countries are growing, there is an increase in concern about the lack of privacy laws in India. Recently, the industry in India has at last started publishing regulations about data protection gradually (Kumaraguru and Cranor, 2005). Considering these contexts, it can be said that Indian people have less chance to know the concept of privacy concerns until recently. This might lead Indian users to have weak anonymity consciousness.

Self-disclosure Model

Here, we address the issue on RQ2 "*to what extent is self-disclosure associated with usage objectives and anonymity consciousness in the United States, India, and Japan?*".

We explain the way for examining self-disclosure model (Figure 1). First, based on whether users disclose each disclosure item, we classify the users into two groups: disclosing group (Dg) or closing group (Cg). Second, we examine the differences in distributions of intensity of each type of usage objectives (uo_i) and anonymity consciousness (*AC*) across these two groups. For this examination, we use Mann-Whitney U test, a statistical analysis that assess whether two samples come from the same population. Finally, we check significant differences. Through this statistical test, we reveal how self-disclosure items are related to usage objectives and anonymity consciousness. This examination is conducted for U.S., India, and Japan.

Table 10. Mean values of uo_i and AC of disclosing group (Dg) and closing group (Cg) for all disclosure items in each country. Statistically significant differences are represented with asterisks ($^*..p < 0.05, ^{**}...p < 0.01$).

	Name		Face		Place		Affiliation		Link		Detail	
	Dg	Cg	Dg	Cg	Dg	Cg	Dg	Cg	Dg	Cg	Dg	Cg
U.S.												
N	58	47	33	72	47	58	13	92	26	79	48	57
uo_{Ke}	0.171	0.173	0.164	0.175	0.171	0.172	0.189	0.169	0.179	0.170	0.184*	0.162*
uo_{Ga}	0.240	0.224	0.226	0.236	0.238	0.229	0.229	0.233	0.207*	0.241*	0.216*	0.247*
uo_{Ra}	0.211	0.219	0.214	0.215	0.205	0.222	0.195	0.217	0.218	0.214	0.224	0.207
uo_{Re}	0.138	0.137	0.151	0.131	0.137	0.138	0.119	0.140	0.138	0.137	0.142	0.134
uo_{Se}	0.115	0.115	0.111	0.117	0.111	0.118	0.114	0.115	0.104*	0.119*	0.110	0.120
uo_{Ad}	0.127	0.132	0.134	0.126	0.138*	0.121*	0.155	0.125	0.156*	0.120*	0.125	0.132
AC	29.21*	32.89*	31.39	30.61	29.55	31.91	30.00	30.98	30.04	31.13	29.44	32.05
India												
N	85	25	43	65	49	59	25	83	21	87	36	72
uo_{Ke}	0.175	0.186	0.180	0.175	0.178	0.177	0.177	0.177	0.181	0.176	0.174	0.179
uo_{Ga}	0.181	0.170	0.180	0.177	0.184	0.174	0.177	0.179	0.190	0.176	0.179	0.179
uo_{Ra}	0.182	0.190	0.180	0.187	0.184	0.184	0.185	0.184	0.183	0.184	0.182	0.185
uo_{Re}	0.157	0.160	0.155	0.159	0.151	0.162	0.159	0.157	0.146	0.160	0.156	0.158
uo_{Se}	0.155	0.159	0.156	0.156	0.155	0.157	0.155	0.157	0.144	0.159	0.161	0.154
uo_{Ad}	0.150	0.135	0.149	0.145	0.147	0.146	0.147	0.146	0.156	0.144	0.148	0.146
AC	26.18*	29.48*	26.16	27.46	26.14	27.61	26.76	27.00	27.81	26.74	26.50	27.17
Japan												
N	22	87	9	100	29	80	9	100	3	106	52	57
uo_{Ke}	0.196	0.177	0.173	0.181	0.173	0.183	0.142*	0.184*	0.103	0.183	0.186	0.175
uo_{Ga}	0.203	0.199	0.169	0.202	0.812	0.206	0.161	0.203	0.189	0.200	0.199	0.201
uo_{Ra}	0.177	0.203	0.199	0.198	0.221	0.189	0.161	0.201	0.186	0.198	0.205	0.191
uo_{Re}	0.158	0.148	0.146	0.150	0.155	0.148	0.191**	0.146**	0.192	0.149	0.148	0.152
uo_{Se}	0.121	0.125	0.172**	1.200**	0.125	0.124	0.156*	0.121*	0.150	0.124	0.124	0.125
uo_{Ad}	0.146	0.149	0.142	0.149	0.144	0.150	0.189**	0.145**	0.180	0.147	0.139	0.157
AC	31.18**	35.75**	31.56	35.12	33.79	35.20	33.33	34.96	32.67	34.89	34.17	35.42

The results are shown in Table 10. In this table, we show mean values of uo_i and AC of users in Dg and Cg respectively. Moreover, we show the number of users in each group. Statistically significant values are represented with asterisks ($^*...p < 0.05$, $^{**}...p < 0.01$). Here, we define the mean value of a factor f in a group G for a country C as $(f^{G,k})_C$. For example, we get $(uo_{Ke}^{Dg,Name})_{US} = 0.171$ from this table.

Self-disclosure Model of U.S. users

In the self-disclosure model of U.S. users, we find that

1. disclosing their real name is negatively associated with intensity of anonymity consciousness ($(AC^{Dg,Name})_{US} = 29.21$, $(AC^{Cg,Name})_{US} = 32.89$, $p < 0.05$),

2. disclosing their place is positively associated with intensity of a usage objective of advertising what they have done ($(uo_{Ad}^{Dg,Place})_{US} = 0.138$, $(uo_{Ad}^{Cg,Place})_{US} = 0.121$, $p < 0.05$),

3. disclosing their web-page link is

   (a) negatively associated with intensity of a usage objective of gathering information ($(uo_{Ga}^{Dg,Link})_{US} = 0.207$, $(uo_{Ga}^{Cg,Link})_{US} = 0.241$, $p < 0.05$),

   (b) negatively associated with intensity of a usage objective of seeking for help ($(uo_{Se}^{Dg,Link})_{US} = 0.104$, $(uo_{Se}^{Cg,Link})_{US} = 0.119$, $p < 0.05$),

   (c) positively associated with intensity of a usage objective of advertising what they have done ($(uo_{Ad}^{Dg,Link})_{US} = 0.156$, $(uo_{Ad}^{Cg,Link})_{US} = 0.120$, $p < 0.05$),

4. disclosing details about their hobby or work is

   (a) positively associated with intensity of a usage objective of keeping in touch with others ($(uo_{Ke}^{Dg,Detail})_{US} = 0.184$, $(uo_{Ke}^{Cg,Detail})_{US} = 0.162$, $p < 0.05$),

(b) negatively associated with intensity of a usage objective of gathering useful information $((uo_{Ga}^{Dg,Detail})_{US} = 0.216, (uo_{Ga}^{Cg,Detail})_{US} = 0.247, p < 0.05)$.

The first finding means that the stronger anonymity consciousness a user has, the less likely to disclose his/her real name the user is. If privacy concerns is replaced with anonymity consciousness, this is consistent with previous work (Joinson et al., 2010; Krasnova et al., 2010) in that anonymity consciousness has a negative impact on self-disclosure. Disclosing their real face is not found to be associated with anonymity consciousness. It is consistent with a conventional report by Qian and Scott (2007), who stated that visual anonymity (publishing photos of their real face) is not greatly associated with self-disclosure (intensity of desires for being anonymous) on blogs.

The second finding implies that U.S. users tend to disclose their place when they aim to advertise themselves. Manually checking profile descriptions of users who disclose their places, we found some users to state their occupation such as marketer, writer, or graphic designer. The speculation for this result is that users may deliver official information on their profile page when they engage in their advertisement. This is also linked to Result 3(c), which indicates that desires to advertise themselves lead users to disclose links to their web page.

The third findings are related to disclosure of users' web-page links. Result 3(a) indicates that U.S. users are not likely to disclose the links to their web pages if they give more weight to gathering useful information. This result might be derived from that users write web pages or blogs for active motives such as helping/informing, expressing idea or thoughts (Hollenbaugh, 2011) not for passive motives such as receiving or viewing information. The previous work (Hollenbaugh, 2011) can also explain Result 3(c) that U.S. users disclose their links when they aim to advertise what they have done. Result 3(b) is not completely explained from the conventional finding on motivations for using blogs (Hollenbaugh, 2011), but it is not surprising. It is likely that users who aim to seek for help are not specialists or experts in some domain, thus they might not have enough information or knowledge to supply other users. Therefore, it can be assumed that they do not have their web pages or blogs.

The fourth findings are related to disclosing users' details about their hobbies or work. Result 4(a) means that when U.S. users primarily use Twitter to keep in touch with other users, they disclose information about their hobby or work. Examining the most dominant audience for U.S. users when they engage in this usage objective, we find that their target audience is potential cyber-world friends (31/48 users targets the audience). As discussed by Kim et al. (2011), they might look for new friends on Twitter who have similar preferences or interests. Result 4(b) is interpreted in that U.S. users do not disclose their details when they aim to gather useful information. This might be because information about their hobby or work are not needed to be published when they gather information.

Self-disclosure Model of Indian users

In the self-disclosure model of Indian users, we find that disclosing name is negatively associated with intensity of anonymity consciousness $((AC^{Dg,Name})_{IN} = 26.18, (AC^{Cg,Name})_{IN} = 29.48, p < 0.05)$. Anonymity consciousness have nothing to do with disclosing real face. As well as self-disclosure model of U.S. users, these findings are supported by previous work (Joinson et al., 2010; Krasnova et al., 2010; Qian and Scott, 2007).

Although usage objectives or motives on social media are reported to be associated with self-disclosure on the social media (Chang and Heo, 2014; Hollenbaugh and Ferris, 2014), we find no correlations between all usage objectives and all disclosure items in self-disclosure model of Indian users. It means that self-disclosure on Twitter is not controlled by usage objectives on Twitter for Indian users. As discussed in subsection , there is a less tendency for avoiding privacy risks until recently in India. Disclosing their personal information is so usual for them that they may not regard self-disclosure as means of accomplishing their usage objectives on Twitter.

Self-disclosure Model of Japanese users

In the self-disclosure model of Japanese users, we find that

1. disclosing their real name is negatively associated with intensity of anonymity consciousness $((AC^{Dg,Name})_{JP} = 31.18, (AC^{Cg,Name})_{JP} = 35.75, p < 0.01)$,

2. disclosing their real face is positively associated with intensity of a usage objective of seeking for helps $((uo_{Se}^{Dg,Face})_{JP} = 0.172, (uo_{Se}^{Cg,Face})_{JP} = 0.120, p < 0.01)$,

3. disclosing their affiliation is

    (a) negatively associated with intensity of a usage objective of keeping in touch with others $((uo_{Ke}^{Dg,Affiliation})_{JP} = 0.142, (uo_{Ke}^{Cg,Affiliation})_{JP} = 0.184, p < 0.05)$,

    (b) positively associated with intensity of a usage objective of releasing stress $((uo_{Re}^{Dg,Affiliation})_{JP} = 0.191, (uo_{Re}^{Cg,Affiliation})_{JP} = 0.146, p < 0.01)$,

    (c) positively associated with intensity of a usage objective of seeking for help $((uo_{Se}^{Dg,Affiliation})_{JP} = 0.156, (uo_{Se}^{Cg,Affiliation})_{JP} = 0.121, p < 0.05)$,

    (d) positively associated with intensity of a usage objective of advertising what they have done $((uo_{Ad}^{Dg,Affiliation})_{JP} = 0.189, (uo_{Ad}^{Cg,Affiliation})_{JP} = 0.145, p < 0.01)$.

The first finding can be explained from previous work (Joinson et al., 2010; Krasnova et al., 2010) as well as the self-disclosure model of U.S. and Indian users.

The second finding indicates that Japanese users disclose their real face when they need helps from other users. Generally, people have to be trusted by others when they seek help from surrounding people. Thus, Japanese users are likely to acquire others' trust in exchange for their visual anonymity when seeking for help or opinions from others.

The third findings are related to disclosure of their affiliation. Result 3(a) means that Japanese users are less likely to disclose their affiliation when they aim to communicate with other users. Examining the most dominant audiences for Japanese users who close their affiliation when they engage in keeping in touch with others, we find their target audiences are family (10/100 users) and real-world friends (35/100 users). Therefore, the reason behind it can be that they do not need to disclose their affiliation to interact with the audience.

Result 3(b) indicates that Japanese users tend to disclose their affiliation if they give weight to releasing stress. This is interesting, but we cannot give any insights for it. In future work, we are going to minutely investigate the reason why they disclose their affiliation when aiming to release stress. With respect to Result 3(c) and 3(d), we discuss them in the next subsection.

Cultural Differences in Self-disclosure Models across U.S., India, & Japan

In this subsection, we take up RQ3 "*to what extent is self-disclosure model different in the United States, India, and Japan?*". On the basis of the findings on RQ2, we discuss the cultural differences in the self-disclosure model of the three countries. The self-disclosure models based on our analysis in RQ2 are respectively depicted in Figure 4. Positive and negative correlations are represented in solid and dotted lines. Also, thin and thick lines indicate $p < 0.05$ and $p < 0.01$ at the correlations.

We find out anonymity consciousness to have an negative impact on disclosing real names in every country (U.S. and India: $p < 0.05$, Japan: $p < 0.01$). This result suggests that a real name is regarded as the most personally identifiable information of the disclosure items regardless of differences in cultural backgrounds. Also, it is implied that anonymity consciousness is a psychological measure that is related to disclosing real name in various cultural backgrounds.
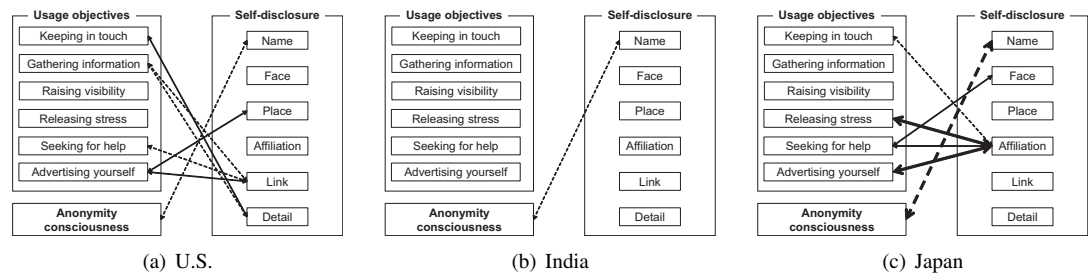

        (a) U.S.   (b) India   (c) Japan

Figure 4. Self-disclosure model of U.S., Indian, and Japanese users (positive and negative correlations are represented in solid and dotted lines, $p < 0.05$ and $p < 0.01$ are represented in thin and thick lines)

In addition to that, our analysis on cultural differences in intensity of anonymity consciousness indicates that the intensity is significantly different by country (India<U.S.<Japan, $p < 0.01$). Furthermore, we found that the ratio of users disclosing their real name also significantly differs by country (India>U.S.>Japan, $p < 0.01$). The countries' orders of both the intensity of anonymity consciousness and the ratio of name-disclosing users are conversely consistent. It indicates that there is a possibility to estimate the ratio of users who disclose their real name in Twitter profiles in a country (other than U.S., India and Japan) from anonymity consciousness acquired from users in the country. However, we have data of only three countries; therefore it is necessary for us to investigate them in more countries in order to generalize the assumption.

When engaging in the usage objective of keeping in touch with others, U.S. users are more likely to disclose their details about hobby or work ($p < 0.05$), and Japanese users are less likely to disclose their affiliation ($p < 0.05$). From our investigation about target audiences of users according to each type of usage objectives, it is found that when disclosing the items, U.S. users aim at (potential) cyber-world friends (31/48 users) and Japanese users aim at family (10/100 users) and real-world friends (35/100 users) if they keep in touch with other users. It means the reason why U.S. users disclose their detail about their hobby or work for communicating with other users is that they target (potential) cyber-world friends. Also, the reason why Japanese users do not disclose their affiliation for communicating with other users is that they aim at their family and real-world friends. There is possibility that U.S. users tend to look for new friends who has similar preference or interests, and that Japanese users prefer communicating with their friends on Twitter as well as in the real world.

In the self-disclosure model of U.S. users, seeking for help is negatively associated with disclosing their web-page link ($p < 0.05$). As discussed before, it may derive from the motives for using web pages or blogs (Hollenbaugh, 2011) or the lack of information to provide with other users. In the model of Japanese users, the usage objective is positively associated with disclosing their real face ($p < 0.05$). This result may come from cultural differences in practice of seeking for help. In U.S., they have values that people should "strive to be the best they can be" (Hofstede, 2016). Seeking for help may be regarded as showing their weakness in their culture. There is possibility that U.S. users are resistant to disclose their web page that generally contains substantial information about the self when seeking for help. In Japan, there are a small number of users who disclose their real face in Twitter profiles. In their culture, showing their real face means making a sacrifice of their visual anonymity. When seeking for help, Japanese users might sacrifice their visual anonymity disclosing their real face in order to obtain others' trust.

When aiming to advertise what they have done, U.S. users tend to disclose their web-page links but Japanese users tend to disclose their affiliation. It derives from differences between individualism and collectivism culture. U.S. is well known as having individualism culture (Hofstede, 2016), where people prefer discriminating between the self and others in their communication and give weight to being unique from others (Morio and Buchholz, 2009). As mentioned above, web pages or blogs are generally used as means for expressing one's idea or thoughts. Thus U.S. users are likely to convey "who I am" publishing their web-page links when they aim to advertise themselves. On the other hand, Japan is characterized as collectivism culture (Hofstede, 2016), where people respect group harmony and build in-groups of specific members (Hall and Hall, 1989). Due to it, Japanese people tend to give much weight to one's affiliation as credible information. When Japanese users advertise themselves, they intend to acquire others' trust disclosing "where I belong".

DISCUSSION

Self-disclosure in Twitter vs. Other Social Media

To adopt our results to other media, we need to consider media affordance that might influence how users disclose themselves. Compared to other social media such as Facebook or Google+, Twitter forms a unique circumstance because of unidirectional following relationships among users. Twitter users can start following others without partners' confirmation; therefore they can follow strangers and can be followed by strangers. From this, it is difficult for users to understand who are the audience on Twitter (Choi and Bazarova, 2015). Choi and Bazarova (2015) investigated differences in why and how intimate contents people post between on Twitter and on Facebook. It was found that Twitter users talked about less intimate topics than Facebook users, and that there were more users whose goals of self-disclosure are conveying ones' identities, enjoying the medium, seeking others' approval or supports, and expressing feelings or thoughts in Twitter than in Facebook. The focus of the previous study is different from that of our

study; however the results are partially consistent in that one of the motives to disclose themselves is to seek others' opinions. People might regard Twitter as a place for self-expression rather than social gathering. We recommend other researchers or developers to apply our findings to media mainly used as self-expression not social engagement.

Also, considering difficulty for Twitter users to grasp the audience, we introduced the concept of anonymity consciousness to examine self-disclosure of personal information in Twitter. Anonymity consciousness represents threats for being interacted with by strangers; therefore it is related to "imagined audience" (Marwick and Boyd, 2011). It is known that users take clues from social media to imagine who view the selves (Boyd, 2007); however, as mentioned above, grasping the audience is difficult (Choi and Bazarova, 2015). Therefore, users who do not disclose their real names (i.e. who have high anonymity consciousness) would feel comfortable with a function to get clues about audience for a medium like Twitter, where they have a lot of chance to interact with strangers, to manage their profiles in safe. However, we did not assess yet whether the relationship between anonymity consciousness and self-disclosure is confirmed on other social media. In the context of Facebook, anonymity consciousness might shrink because of the environment where users are recommended to use real names and users can control the audience. It is interesting to understand to what extent Facebook users have anonymity consciousness, and to discuss difference in media affordance that motivate users to hide their identities.

Design Implications

Our results showed that self-disclosure was influenced by usage objectives and anonymity consciousness. Based on the results, we suggest some design policies for making people get rich user experience on social media.

Notably, anonymity consciousness was found to be negatively related to disclosure of real name in Twitter profiles in each country (Figure 4). It means that hiding name is regarded as a good way for avoiding interaction with strangers. We are able to estimate users' degree of anonymity consciousness whether they disclose their real name or not. It would be effective to recommend real-world friends to users if they do not disclose their real name because their anonymity consciousness might be high, i.e., they aim to avoid interaction with strangers. Also, if users do not disclose real names, they would be comfortable with a function to control audience who can see posts of the users such as "only mutual-following people," "only connected people," or "everyone."

Motivation to advertise what people have done was positively correlated to disclosure of links to web pages and living places for U.S. users (Figure 4(a)). It means U.S. users publishing their web-page links and living places can be estimated as those who aim to advertise themselves. If U.S. users disclose these two items, raising visibility of the users, such as making them appear in search or recommendation results as priority, would be effective. However, it should be noted that disclosure of web-page links was negatively related with seeking help and gathering information. Especially, even if users do not aim to seek help or opinions, raising visibility of their profiles or tweets might be ineffective because they do not need to reach not-connected users for gaining helps or supports. Thus, it is important to consider disclosure of the two items, web-page links and living places, when increasing the number of occurrence of the users in search or recommendation results.

For Japanese users, motive to advertise themselves and motive to seek for help were found to be positively related to disclosure of the affiliations they belong to (Figure 4(c)). It can be said that Japanese users who disclose their affiliations are regarded as aiming to advertise themselves or seek for helps or opinions. If Japanese users disclose their affiliations, it would be useful for these users to make them shown in search or recommendation results so that other users can know the users who advertise themselves or seek helps. However, we cannot understand why releasing stress was positively related to disclosure of affiliations; therefore in the future, we need to assess whether the making the users shown in the search or recommendation results is valid or not for users who aim to release their stress.

Figure 4(c) shows the positive relationship between seeking for help and disclosure of face for Japanese users. As well as users who disclose their affiliations, users disclosing their faces would be comfortable if their tweets were aggressively appeared in search results. From this, it is expected that Japanese users seeking helps or opinions easily get helps or opinions.

Impact on Online Social Communities

In this section, we discuss the implications of our results for other online social communities (OSCs) such as massive open online courses (MOOCs) and Q&A sites. We note that both of these OSCs have similar

potential issues related to anonymity consciousness and usage objectives; therefore, both might benefit from further study of user preferences and from design choices to support different levels of anonymity consciousness.

In most MOOCs, the primary ways in which users participate in public or semi-public spaces are through discussions of coursework in threaded discussion forums, and possibly in providing feedback in peer-grading. The peer-grading system usually avoid linking user identity to the contributions, so a student with higher anonymity consciousness can simply avoid making statements that self-identity in the feedback. Forums, on the other hand, do include user IDs and often link to user profiles. Hence students may wish to consider whether their profile or ID reveals their real name or contact information.

We are particularly interested in how some of the cultural differences may play out in the MOOC forum space. Prospective questions are: Would Japanese students be more likely to include an affiliation in their post or profile? Would US students be less likely to include a link to their home page? Would the behaviors be different for those primarily seeking for help compared with those providing help to others, or for those with higher status?

Some of the same dynamics appear in online Q&A sites. In such sites (e.g., Quora or Yahoo! Answers), users post questions and get (or give) answers. Additionally, these sites usually offer users an opportunity to self-identify both with a name and with other personal information (e.g. affiliation and position). Quora in particular often has high-status individuals who self-identify and address questions targeted directly at them. Therefore, it might be difficult for those users to get high status as protecting their identities, because disclosure of personal information sometimes leads to reliability from others.

We think it would be interesting to explore how users balance anonymity consciousness with usage purposes in Q&A sites. There are several issues worth being addressed. For example, which personal information would users disclose to balance the motive to get high reputations with the desire to avoid being identified and reached by strangers? Also, how would users avoid the dilemma between the anonymity to post questions casually and the disclosure to get reliability as answerers? Moreover, it might be important to examine cultural differences in these questions as our results indicated.

Limitation

Several limitations lies in our study design. First, people in nonage are not included in our subjects. In terms of privacy issues, it is highly important to understand how the young disclose themselves on social media. According to previous studies, adolescents are more likely to disclose themselves on Facebook (Christofides et al., 2009) and less likely to use privacy settings (Christofides et al., 2009, 2010) than adults. It leads adolescents to be exposed to privacy danger because social media provide us with place to interact with strangers inclusive of malicious or trolling users. However, our study cannot address the issue because we gathered our subjects by crowd sourcing services in which people under 18 years old cannot use the system. In future work, we collect young people and examine how and why they disclose via e-mail or banner advertisement on social media.

Second, other than usage objectives and anonymity consciousness, some factors seem to have an impact on self-disclosure. Researchers on self-disclosure in Facebook have examined how self-disclosure is influenced with satisfaction with Facebook (Special and Li-Barber, 2012), trust in Facebook (Krasnova et al., 2012; Dwyer et al., 2007), trust in other members on Facebook (Krasnova et al., 2012; Dwyer et al., 2007), perceived enjoyment (Krasnova et al., 2009, 2012), educational backgrounds and annual incomes (Consedine et al., 2007), or personality (Hollenbaugh and Ferris, 2014). Although we investigate self-disclosure in Twitter profiles, we are going to take these factors into account in order to model self-disclosure mechanisms in Twitter.

Third, we recruited the participants on crowd sourcing service, Amazon Mechanical Turk for U.S. and Indian users and Yahoo! Crowd Sourcing Service for Japanese users. The participants in our study can be convenience samples; therefore, as suggested by Paolacci and Chandler (2014) or Goodman and Paolacci (2014), we made maximum efforts to get high-quality data from online survey by checking inconsistency within responses for each user, validating consistency between responses and actual behaviors on Twitter for each user, and comparing self-disclosure of participants and that of general Twitter users to know how participants are representative samples. However, there is still a possibility that characteristics of people depend on the platforms; therefore we need to verify this issue in the future work.

Finally, the design of questionnaire for anonymity consciousness is limited in terms of context of the situation and options of personal information. We adopted curbside interviews as the situation where

people are interacted with by others; however there are still some cases such as social parties, academic conferences, or online dating sites. In order to exclude the effects of motives for gaining benefits when people disclose themselves, the situations are not used in this study. Also, we used name, photos, and email as personal information to be asked to provide, but there are several alternative options such as living place. We believe that this design was adequate as a first step to examine the relationship between self-disclosure of typical personal information and anonymity consciousness as a universal scale; however, in order to create more robust scale of anonymity consciousness, we need to consider more personal information and build a multi-dimensional scale of anonymity consciousness in the future work.

CONCLUSION

In this study, we conducted a survey to investigate cultural differences in self-disclosure, usage objectives, and anonymity consciousness for Twitter users in U.S., India, and Japan. Moreover, we verified significant relationship of the factors in self-disclosure models for U.S., Indian, and Japanese users. Finally, we discussed cultural differences in self-disclosure models.

We found that the number of self-disclosing users, the intensity of usage objectives, and the intensity of anonymity consciousness significantly differ by cultural backgrounds. Additionally, our results indicated that anonymity consciousness has a negative relation with name disclosure regardless of cultural backgrounds. Also, it is found that usage objectives significantly correlates to self-disclosure for U.S. and Japanese Twitter users.

To the best of our knowledge, this is the first study to examine the relationship between self-disclosure and usage objectives or anonymity consciousness for Twitter users in U.S., India, and Japan, and conduct cultural comparison. We still have several limitations in the study; however, we believe that our results contributes to understanding why people disclose themselves in public space and gives important insights for designing online social communities.

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