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An Analysis Between SNS and Social Capital Types in Japan

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Abstract. Social capital is expected as a concept to evaluate the potential of autonomous cooperative behavior of a person in a group. We aim to analyze the relationship between individuals and group and their conditions from the viewpoint of social capital and establish an intervention method that leads to well-being in a group of various sizes. We assume that individual's type of social capital can appear in the behavior on Twitter. We report the results of a questionnaire survey. The questionnaire survey suggested that the types of social capital that are bonding and bridging may cause differences in behavior on Twitter, especially in the types of tweets that respond.

Keywords: Social Capital, SNS, Bonding, Bridging

1 Introduction

In the short period of time since the start of mobile communication services, the means of interaction between people via networks has been changing rapidly. What started as pager-centered one-way communication has now evolved into SNS-centered communication with the spread of smartphones [1]. Changes in the means of communication have enabled not only the communication of "business" with distant parties, but also the communication of emotions such as enjoyment and empathy. Recently, the use of virtual spaces has been attracting attention, and the evolution of means of interaction is expected to continue in the future. In addition, the use of virtual space is also attracting attention, and it is expected that the means of exchange will continue to evolve in the future.

Although the term "social capital" itself has been used by various people since the beginning of the 19th century, in 1993, Putnam wrote in "making democracy work" [2] that "social capital is the ability to increase social efficiency by stimulating cooperative behavior. Since then, the concept has been widely used. It is often replaced by the proposition of how each person should relate to other people and society in order to enhance social life.

Social capital, which is explained as a way to avoid the "tragedy of the commons," in which the efficiency of land use is reduced when many people act selfishly on the land they share, is a concept that should be reevaluated in the unprecedented situation brought about by COVID-19. We have analyzed the current situation and how information can contribute to the situation brought about by COVID-19 and the future. In Japan, in particular, we have been experiencing major environmentally critical situations due to disasters, but the critical difference between this situation and the past is that we are dealing with a situation in which the Internet has ensured the acceptability of information.

The results of examining the degree of prosperity of each country from 12 perspectives: safety and security, individual freedom, governance of power, social capital, investment environment, corporate environment, market access and infrastructure, quality of economic system, living environment, health, education, and natural environment have been investigated [3]. This report indicated that Japan is ranked 19th in the world, but only social capital belongs to the lowest group, 143rd in the world. This must be a shocking result. This is what prompted us to start this research.

Social networks, which are generated from connections between people, are thought to bring benefits to individuals and groups as well as physical and human capital. They have been conceptualized as social capital and have attracted attention in various fields such as sociology, economics, and welfare [4] [5] [6] [7]. The definition has been proposed variously. For example, Coleman (1988) [8] proposed that social capital is defined by its function, and that there are two common elements. One is that all social capital has an aspect of social structure. The other is that all social capital promotes some actions of the actors within the structure. In other words, it is contained within the structure of relationships between actors, and is included in the purpose and purpose of the actors. Putnam (2000) [9] defines social capital as "social networks and their associated. Although there are various definitions of social capital, social networks of people and people share some value and function in common.

Putnam (2000) also took up the concepts of bonding and bridging as the most important distinction between social capital. Bonding social capital has an inward orientation, stabilizes specific reciprocity, and strengthens solidarity. In contrast, bridging social capital has an outward orientation and strengthens connections and communication with external resources. Most groups and the individuals who make up them have two aspects of these social capital.

The development of various means of interaction through networks, described above, can be incorporated into people's daily lives, facilitating interaction with friends, family, and colleagues, and increasing these social capital [10]. On the other hand, it is also necessary to understand that there are people who do not benefit from the development of means of exchange. In Japan, following the United Kingdom, the Minister for Solitude has been established, and efforts are being made to eliminate social loneliness and isolation. [11] Even if means of exchange increase, if connections cannot be formed, maintained, and utilized using those means, they may not lead to connections, but to divisions and isolation. It will be necessary to find an appropriate balance between groups of people while taking into consideration the characteristics of bonding and bridging social capital, and to consider intervention methods as necessary.

Our goal is to assess the state of people in groups of various sizes and to establish interventions that lead to wellbeing. The enhancement of the means of interaction through the Internet will continue to support the change from traditional communities based on locality to those centered on networked individuals [10].

In this paper, we report the results of a basic survey on the relationship between cognitive social capital and information sources, and the relationship between cognitive social capital and behavior on Twitter.

The structure of this paper is as follows: Chapter 2 introduces existing research on measuring online social capital; Chapter 3 introduces the methods and results of a basic survey on the relationship between cognitive social capital and behavior on Twitter; Chapter 4 discusses the results of the survey; and Chapter 5 provides future plans and summaries.

2 Internet social capital scales

Social-related capital is a multifaceted concept, and various measures have been devised to measure it. Focusing on the social-related capital of a group, there are measures that use indicators obtained by processing statistical data on various community activities [9] [12], measures that create and analyze indicators through questionnaire surveys [13], and measures that focus on the social-related capital of an individual and analyze the social networks of each individual, such as neighbors, friends, and relatives, from the viewpoints of closeness of relationships, social standpoints, and support that can be obtained [14] [15] [16]. Methods have also been devised to estimate social-related capital by distinguishing it into bonding and bridging types.

In recent years, SNS and online information dissemination have become widely used, and the resources available to each individual are no longer limited to direct acquaintances. To investigate the impact of the Internet on social capital, Williams (2006) [17] created the Internet Social Capital Scales (ISCS), which measures bonding and bridging social capital in both online and offline contexts. ISCS measures each individual's cognitive social capital by a group of similarly worded questions online and offline. Ellison et al. (2007) [19], referring to Williams (2006), proposed social capital of the relationship maintenance type in addition to the bonding type and the bridging type, focusing on the extent to which old acquaintances and friendships can be maintained. (2007) conducted a survey using ISCS, including the relationship maintenance type, and pointed out the strong relationship between Facebook use and social capital. In particular, it was pointed out that individuals with low life satisfaction and low self-esteem may have higher social capital as a bridge by using Facebook than individuals with high life satisfaction and self-esteem. Hofer and Aubert (2013) [20] investigated the relationship between Twitter use and social capital as an online bonding type and a bridging type. We examined the relationship between the number of followers and social capital as well as the number of followers and the bridging type company.

Studies using ISCS have shown that there are different characteristics of social capital between bridging and bonding types, and that there are different relationships between SNS usage attitudes.

Some argue that the bonding and bridging type social capital measures derived from Williams (2006) do not reflect actual social capital [18], but there are many reports that measure different aspects of bonding and bridging type social capital measures derived from Williams (2006). This paper also uses the measures derived from Williams (2006).

In the next chapter, we will explain our basic research on the types of social capital and the differences in trust in information sources, including SNS, and responses to information on Twitter.

3 Research on the relationship between social capital and Twitter behavior

3.1 Details of the investigation

In order to investigate the relationship between social capital, trust in information sources including SNS, and behavior on Twitter, a questionnaire was used. For the recognition of bonding and bridging social capital, the top three items with the highest factor loadings corresponding to the online bonding and bridging types which were developed by Williams (2006) were translated into Japanese and used as a scale. The questions were answered on a 5-point scale from "Not at all agree" to "Strongly agree." In response to the question, "How much do you trust information from the following channels in order to know the general information that you are talking about?" four routes were used: newspapers, television, social networking services "From a friend I know firsthand (Whether by face-to-face, telephone, SNS, etc.)", and social networking services (except for information from direct friends). The response items were classified into four categories, ranging from "not at all" to "fully trust."

In regard to Twitter's actions, we asked for the possibility of each action, along with approval or disapproval, for seven examples of fictitious tweets, as six types: likes, positive replies, negative replies, retweets, quoted retweets with positive comments, and quoted retweets with negative comments. We also asked for the possibility of each action if the attribute of the person who posted the tweets was added to the conditions of "if he/she met someone on the Internet" and "if he/she knew someone in real life." We created seven examples of fictitious tweets based on actual tweets and made them fictitious in addition to the contents of tweets such as account names and icons.

Fictional Tweet Example 1 is a tweet from a mother who has a child, in which she expresses her joy at the consideration of the other person when she talks with her friend in the park. Fictional Tweet Example 2 is a tweet from a healthcare worker who is busy with the coronavirus and asks for a relaxing stay at home to reduce the number of infected people. Fictional Tweet Example 3 is a tweet criticizing a person who links GoTo's policies to the spread of the coronavirus. Fictional Tweet Example 4 is a tweet criticizing people who say "corona is just a cold" as being treated as a cult. Example 5 is a tweet criticizing people who say there is no safety problem because many people

die from vaccination overseas. Example 6 is a tweet stating the safety of mRNA vaccines and stating that smoking is riskier. Example 6 is a tweet containing a link (fictitious) to an underlying Web page. Example 7 is a tweet appealing for the right to choose a vaccine. The tweet is coming from the fact that there are differences inside reactions depending on the type of vaccine.

3.2 Survey Method

A total of 1369 responses were received over a 3-day period from March 2, 2021. Of the 1369 responses, 758 were males and 611 were females. In the age group, 182 were males in their 20s and younger, 254 were females in their 30s, 332 were males in their 40s, 333 were males in their 50s, and 268 were females in their 60s.

The primary objective of this survey was to determine the subjective meanings that users ascribe to the information they receive and act upon on social networking sites. For this reason, we intentionally asked about subjective awareness. After confirming certain trends through this process, we believe it is possible to argue the significance of examining the relationship with composite data, such as actual behavior on SNSs.

The survey was conducted by screening about 1,400 respondents from a panel of 120,000 people, equalizing age, gender, and other factors, and then asking them questions. Since the survey is conducted via the Internet with incentives, the response rate is extremely high, and responses can usually be obtained in one or two days.

The analysis was performed using jamovi [21], and the correlation calculation was performed by calculating the partial correlation [22] as well as the normal correlation.

3.3 Survey Results

Table 1 shows the results of factor analysis of the Social Relational Capital Scale, the coefficients of each factor, and the correlation coefficients between the factors. We used the ordinary least squares (unweighted least squares) to extract the factors from the Oblimin rotated factor pattern matrix. The two factors were interpreted as the online bridging factor and the online binding factor, respectively, following previous studies. The three questions of the online bridging factor and the online binding factor were used as the measures of each social relationship capital. When the scale scores were calculated, the results were $M = 2.71$, $SD = 1.00$ for the online bridging factor, and $M = 2.35$, $SD = 0.93$ for the online binding factor.

Table 1. Factor analysis of Social Capital scale

<i>Factor analysis results (least squares method, Oblimin rotation, N=1369)</i>			
Questionnaire	1 st factor	2 nd factor	Commonality
Socializing on the Internet makes me want to try new things.	0.68	0.19	0.68

Socializing on the Internet has made me curious about the rest of the world.	1.00	-0.07	0.90
Socializing on the Internet makes me feel more connected to the larger world.	0.77	0.11	0.72
There are people on the Internet that I can trust to help me with my problem.	0.19	0.67	0.67
There are people on the Internet that you can ask for advice when making important decisions.	-0.09	0.90	0.70
Those who associate with me on the Internet will enhance my reputation.	0.13	0.71	0.65

Table 2. Correlation between trust in information sources and social capital type
Partial correlations (using Spearman's correlation coefficient) of each social capital excluding each other's influence are described.
(correlation coefficient / significant probability)

Information source	Bridging	Bonding
Newspaper	0.04 / 0.105	-0.01 / 0.600
TV	0.05 / 0.91	-0.01 / 0.663
From a friend who knows firsthand	0.13 / <0.001	0.02 / 0.369
SNS, exclude the above friend	0.14 / <0.001	0.14 / <0.001

Table 2 shows the results of the analysis of the correlation between the trust in information sources and the type of social capital. Although the correlation coefficient data obtained were relatively small, the analysis focused on significance levels of 1%. The responses for SNS (except for information from friends with direct knowledge) showed a significant correlation with both the online bridging type and the online bonding type, while the responses for newspaper and TV showed no significant correlation with both the online bridging type and the online bonding type. The responses for "From a friend I know firsthand (Whether by face-to-face, telephone, SNS, etc.)" showed different results for the online bridging type and the online bonding type, with a significant correlation only with the online bridging type.

Table 3. Correlation between "likes" and social capital type for seven fictional tweet examples
correlation coefficient and significant probability are described according to the order of "normal/Online acquaintances/Real friend"

Tweet example	Online Bridging Correlation Coeff	Online Bridging Significant Probability *np: <0.001	Online Bonding Correlation Coeff	Online Bonding Significant Probability *np: <0.001
1	.11 / .20 / .22	np / np / np	.12 / .03 / -.01	np / .287 / .800
2	.15 / .18 / .20	np / np / np	.08 / .07 / .01	.003 / .015 / .808
3	.02 / .05 / .06	.402 / .095 / .019	.19 / .17 / .15	np / np / np

4	-.03 / -.00 / -.01	.293 / .991 / .833	.21 / .20 / .19	np / np / np
5	-.04 / -.03 / -.03	.109 / .260 / .277	.21 / .21 / .20	np / np / np
6	.09 / .08 / .09	np / .002 / .001	.13 / .14 / .12	np / np / np
7	.12 / .13 / .13	np / np / np	.13 / .11 / .10	np / np / np

This paper presents the results of analyzing the correlation between actions and social capital types for the seven examples of tweets.

The behaviors of “likes” were analyzed. The results are shown in Table 3. When analyzed at a significance level of 1%, the online bonding type showed a correlation with tweets 3,4 and 5. On the other hand, the correlation of the online bridging type shows relatively high values for Tweet Examples 1, 2, 6, and 7, but not for Tweet Examples 3, 4, and 5. Furthermore, the correlation tended to be higher when conditions for online and real acquaintance were established.

4 Discussion

According to the results of factor analysis (Table 1), there is a high correlation between bridging and bonding social capital, and both are strongly related. The results shown in Table 2 indicate that the accumulation of online social capital, regardless of whether it is a bonding or a bridging type, is related to a sense of trust in information on SNS. Similarly, in Table 2, the relationship between trust in information from "friends with direct knowledge" differs between the bonding social capital and the bridging social capital. Existing research [23], which has analyzed the differences between the bonding and the bridging type, uses an index for ties with family and relatives for the bonding social capital, and an index for ties with friends for the bridging social capital, which is consistent with existing research.

The results of the analysis in Table 3 indicate that there is a difference between the online bridging type and the online bonding type in the number of tweets that respond. The online bonding type seems to tend to "like" without distinguishing the target, compared to the online bridging type. The bonding type is considered to understand and respond to the content of tweets that contain criticism, because it creates a clear boundary between us and them and has a mechanism that encourages commitment to us while generating a certain degree of exclusivity [7]. The bridging type breaks down the boundary between the inside and outside, and connects other groups to each other, which are relatively highly correlated with those of the bridging type, request the sharing of happy feelings and the cooperation of each person to reduce the number of infected people, making it difficult to imagine groups that would be directly disadvantaged. By extracting differences in responses to tweets, it is possible to estimate cognitive social capital.

Conversely, tweets that respond to the online bonding type, tweets that respond to the online bridging type, and both types of social capital might be able to estimate the influence and quality of information from different trends in information propagation.

By further testing these hypotheses, we believe that cognitive social capital can be estimated from social networking services and other activities, leading to time-series changes in the group and assessment of its status. In the case of actual Twitter analysis, liking is a behavior that is likely to be controversial. We believe that a method of analysis focusing on liking is necessary.

5 Summary

To estimate the type of cognitive social capital of everyone from observable data, we conducted a basic study using a questionnaire on the relationship between cognitive social capital and behavior on Twitter. The results of the basic study suggested that differences in cognitive social capital might cause differences in behavior on Twitter. Bonding social capital tends to "like" without distinguishing between subjects, or to respond to content of tweets that include criticism. On the other hand, bridging social capital tends to be unresponsive to content of tweets that include criticism. Social relations capital tended to respond to tweets that did not disadvantage a particular population.

In the future, it will be necessary to verify whether it is possible to estimate social capital using data on actual SNS.

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