Japanese-American Frontiers of Science

2004 Program -- Social Networks

Social Network Structure and Solidarity of the Society -Presentation

Ryuhei Tsuji Department of Psychology, Meiji Gakuin University

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Double meanings of trust

"I trust him, because he's a good guy." This statement shows that I have known him for such a long time that I have a lot of information on him and have a lot of evidences to believe that he is good to me in person. On the other hand, there is a belief such that "Human beings are generally trustworthy." This statement does not imply any particular person's trustworthiness, i.e., does not refer to any person's information. The former type of trust is called "individual-based trust," and the latter is called "general trust," i.e., trust in other persons in general.

There are two ways of developing human relationships. One is to utilize the relation of individual-based trust. Rapoport (1957) proposed that human relations are not developed at random; there is a bias toward "one's friends become friends." This process creates the triad closure (transitive closure). So, if you observe a collective of people and find many transitive closures there, it implies that the collectives are not just like a crowd of people in the downtown of a city, but a group of people in which a strong sense of individual-based trust connects them together. Thus the process of developing transitive closure is the process of developing a closed commitment among them. The other way of developing human relationships is to utilize general trust. General trust plays a role to expand the relationship outside the group because it may encourage the person to create a relationship with a person unknown to him/her. That is, general trust fosters an open relationship with many acquaintances.

From small group solidarity to societal solidarity

Why do we have a tendency to form transitive closures? Let there be three persons i, j, and k; and i individually trusts j and j individually trusts k. Then i can trust k on security of the j's trust on k. If k does a

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malicious treatment on i, then k not only loses i's trust but also j's. Furthermore, as the transitive closure occurs not only among (i, j, k), but also among (i, k, j), (j, i, k), and so on, the commitment among the three becomes much stronger. This may be why people have a bias toward "one's friends become friends," or a tendency to form transitive closures.

In a small group, transitive closures of trust relation can be a device of interpersonal watches for the members to contribute their resources to common goods. In this sense, the number of transitive closures is a good index of group solidarity. Then, what is necessary for the solidarity of much larger society? If we can generalize the model for small groups, it is possible for us to show the conditions for social solidarity. Here, Watts' small world simulation is applicable.

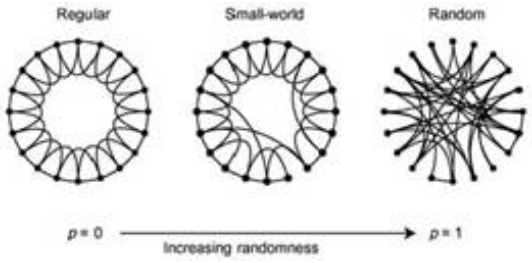

Figure 1: Small World Diagram (From Watts and Strogatz (1998))

Look at the regular state in Figure 1. There are N = 20 persons each of whom has k= 4 certain relations (e.g., acquainted). Watts' small world simulation starts from the regular state, and increases the randomness p little by little by rewiring a tie to a person to another, and then calculate the structural indices, for example the number of average shortest pass, at each stage.

Suppose we take a relation of trust, and examine the effect of the size of a society N, we change N and p fixing k = 150, and observe the effects of N on the transitive closures T. As in Figure 2 and 3, T or T/ T 0 decreases as p increases, and the effect is more salient as N gets larger.

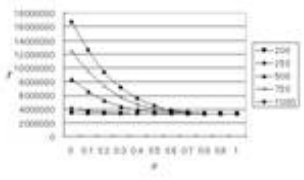
Figure 2: Changes of Tp wrt N

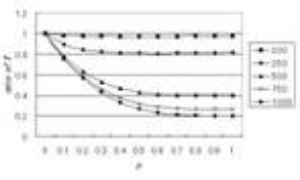
Figure 3: Changes T0/Tp wrt N

To examine the effect of the number of trusting others k, we change k fixing N= 200, and observe the effect of k. As in Figure 4 and 5, T or T/ T0 increases as k increases.

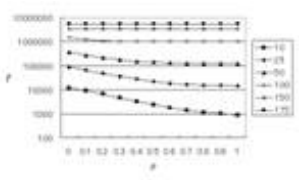
Figure 4: Changes of Tp wrt N

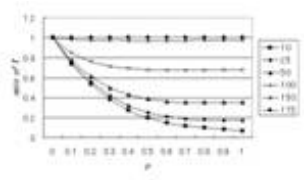
Figure 5: Changes of Tp /T0 wrt

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N

From above results, we can think of three ways of maintaining a high level of solidarity.

(1) By controlling for N: Restrict N so small that people are not worried about how many people to trust or how random the trust relation is. Some examples are those who live in an ethnically segregated urban area, or those who avoid interactions with others except for others in the workplace. A small Nsociety such as a geographically segregated rural area is also in this category.

(2) By controlling for k: Individually trust others as many as possible when N is large. However, human beings cannot trust as many others as they want. Thus, general trust may be a substitute for individual-based trust.

(3) By controlling for p when N>> k: Makes p as small as possible, especially when you try to expand your trust relation kin a large N society, such as promoting community activities to foster individual-based trust inside.

Since those three ways are generated theoretically, we looked for some survey papers in US and conducted a similar survey in Japan to demonstrate whether the model is plausible. According to Killworth et al. (1990), American people in urban areas are acquainted with 1,500 to 2,000 people. On the other hand, Japanese people in both rural and urban areas are acquainted with about 200 to 250 people (Tsuji and Harihara, 2003; Tsuji, 2004). The gap between the numbers of acquaintances for American and Japanese urban people is very large.

Behavioral ecologist Dunbar (1996) examined the size of herds in various animals, and showed that the size of herds suitable for human being was about 150. Then we realize that the size of Japanese (both in urban and rural area) acquaintances is a little more than the basic size, but the size of Americans in urban area is far beyond the basic size. This demonstrates that Japanese people in both rural and urban areas are living there controlling for N as in (1); Americans in urban areas are living there controlling for kand pas in (2) and (3).

Yamagishi and Yamagishi (1994) found the level of general trust is higher in US than in Japan. It is just as expected in (2). Altogether, the model seems to abstract the real world well.