Culture, trust, and social networks

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Although the role of trust in group processes has been well established, less is known about the role of trust in social network processes. Trust, conceptualized to have generalized and particularistic aspects, was measured by generalized trust (people can be trusted in general) and relationism (people can be trusted if one has relationships), and their relations with social network characteristics of network homogeneity (extent to which one has a number of friends with similar attitudes) and network closure (extent to which one's social network is closed) were examined in three Western (Australia, Germany, and the United Kingdom) and two East Asian countries (Japan and Korea). Although generalized trust was shown to be positively related to network closure across the five countries, generalized trust and relationism had different relations with network homogeneity in different cultures. The results were interpreted in terms of social institutional and cultural differences.

Key words: culture, relationism, social network, trust.

Introduction

Trust is fundamental to social life. Defined variously as a positive cognitive bias in judgments about others (Cook & Cooper, 2001), or a type of expectation about others' behaviours (Hardin, 2001), broadly speaking, trust is people's belief in others' good intentions; that is, others' intentions not to harm them, to respect their rights, and to carry out obligations (Yamagishi, 1998). Trust enhances cooperation (Rotter, 1971), thus acting as a psychological lubricant for smooth social processes. In a word, trust is a *sine qua non* of coordinated group living. Indeed, the relationship between trust and group processes is well supported in social psychology. That is, the process of perceiving oneself as a member of a social group with a shared social identity produces trust (Hogg, Abrams, Otten, & Hinkle, 2004). People who share a group membership are perceived to be trustworthy (Brewer, 1979; Yamagishi & Kiyonari, 2000); trusting behaviour is directed towards members of one's ingroup more than outgroups (Tanis & Postmes, 2005).

Nonetheless, less is known about the role of trust in social network processes in psychological social psychology. Social networks consist of relationships among social entities such as individuals, groups, and institutions. Although social processes based on group memberships are closely tied to the perception of oneself as a member of a social category in contra-distinction with other social

categories (Tajfel & Turner, 1979; Turner *et al.*, 1987), social network processes are somewhat independent of, though related to, group memberships. Social networks connect people within and across social groups defined by social category memberships; although people who belong to the same social category tend to form social network ties (McPherson, Smith-Lovin, & Cook, 2001), they also have social ties to members of other social categories. Sociologists have argued that social networks regulate the flow of information, the formation of social norms, the establishment of authority and the administration of sanction against antinormative behaviour, and trust plays a fundamental role in these social processes (Coleman, 1988; Burt, 1993; Lin, 1999; Putnam, 2000).

However, according to Yamagishi (Yamagishi & Yamagishi, 1994; Yamagishi, 1998), two types of trust need to be distinguished, generalized trust and assurance. Generalized trust is a general belief in human benevolence: that is, it suggests that trustworthiness is an aspect of human nature, and most people can be trusted despite some exceptions. Assurance is a trust that stems from secure relationships with particular others. When people form interpersonal relationships to someone with strong commitment, they are likely to trust this person. However, this type of trust is based more on the sense of security arising from the knowledge about, and therefore predictability of, the specific person (Hayashi, Ostrom, Walker, & Yamagishi, 1999). In other words, this particularistic trust is characterized by a socio-relational basis of security in the condition in which social uncertainty does not exist (Yamagishi, Kikuchi, & Kosugi, 1999). Hence, it may be reasonable to say that particularistic trust is conceptually related to relationism, or

the emotional and supportive connectedness of oneself with others (Hamaguchi, 1977; Kashima *et al*., 1995; Uleman, Rhee, Bardoliwalla, Semin, & Toyama, 2000), which is also closely associated with relational self (Brewer & Gardner, 1996; Cross & Madson, 1997; Andersen & Chen, 2002).

The two types of trust, generalized and particularistic, may play different roles in the formation and maintenance of social networks. Generalized trust encourages people to approach others to form social relationships. After all, if most people are believed to be trustworthy, whose good will can be assumed, there should be no impediment to moving out of one's comfort zone, the particular interpersonal relationships that one feels committed to, and get to know unfamiliar others and create social opportunities. Generalized trust, then, should affect behaviours with unknown others, namely, strangers. Indeed, people with high generalized trust are more likely to cooperate with strangers than those with low levels of generalized trust (Yamagishi, 1986). Yamagishi suggests that generalized trust emancipates people from their interpersonal commitments, which could potentially constrain their social and economic activities (Yamagishi, Cook, & Watabe, 1998).

In contrast, particularistic trust marked by emotional connectedness may help people maintain social relationships. After all, humans may have a universal need to form close relationships with emotional bonds (Baumeister & Leary, 1995). Once relationships are formed, people may need to have a sense of emotional connection with those others in order to maintain secure and committed social relationships. Relationism is grounded in a sense of relatedness to particular known others. People with strong relationism may therefore act to maintain social relationships once they are formed. Therefore, although relationism may act to strengthen the commitment to social relationships, it may not encourage people to seek new social opportunities, by finding and forming new social relationships.

In the present paper, we examined implications of the above reasoning for social network structures in different cultures. Social network researchers (Buskens, 1998; Mehra, Kilduff, & Brass, 2001; Kalish & Robins, 2006) have argued that structural properties of social networks should be examined in relation to psychological characteristics. Trust is one of the most obvious choices as the preceding discussion has shown. The above reasoning suggests that generalized trust and relationism may have somewhat different links with social network structures. However, there are meaningful cultural differences in trust and relationism. If one assumes that generalized trust and relationism have the same functional associations with social networks, we may find systematic cross-cultural differences, and such cultural differences may be explainable in terms of generalized trust and relationism. Nonetheless, it is possible that these trust-related variables are differently associated with network structures across cultures. We explored these possibilities.

Social network characteristics

In the context of social networks, there are two different perspectives to describe a set of relationships between individuals. One is a complete network that focuses on an entire group with a clear boundary and, therefore, possesses information among all individuals within the group. A complete network is presented in a two-way matrix for the network, in which the row and the column represent individuals, and the elements represent relationships between individuals. On the other hand, an egocentric network focuses on personal relationships of an individual (or referred to as an ego), whose perspective is used to describe the network. An egocentric network is represented as a two-way matrix for each individual (ego), consisting of an ego with a set of other individuals directly connected with the ego. Along with the previous research examining the relationship between individual dispositions and social network characteristics (Kalish & Robins, 2006), we tapped into the relation of trust with social network characteristics from a viewpoint of egocentric networks.

In relation to trust, we focused on two basic characteristics of egocentric networks. The first is network homogeneity, based on the perceived similarity of others in attitudes and opinions about social issues (Byrne, 1971; Duck, 1975). First, generalized trust may be positively related to network homogeneity. People with high generalized trust may approach others. Given that attitude similarity is an influence on attraction (Byrne, Ervin, & Lamberth, 1970), people with high generalized trust tend to be quicker in the perception of value similarity of others than those with low generalized trust (Siegrist, Earle, & Gutscher, 2003). Thus, people with high generalized trust may form social relationships especially with those who have similar attitudes. Second, once relationships are formed, relational people (i.e. those with high relationism) may maintain these relationships. As relational people may retain their relationships and become more similar to their friends over time, they may have homogeneous networks through social influence on attitudes. Therefore, relationism may also be associated positively with network homogeneity. Finally, generalized trust and relationism may have an interactive effect. People with high generalized trust may make friends with those who share similar attitudes and, if they are also relational, they may develop close, committed social relationships with those friends.

The second important characteristic is network closure. If a person has friends, but these friends do not have friendships with each other, this constitutes a highly open network; by contrast, if these friends are friends with each other, it is a closed network. In the present study, two
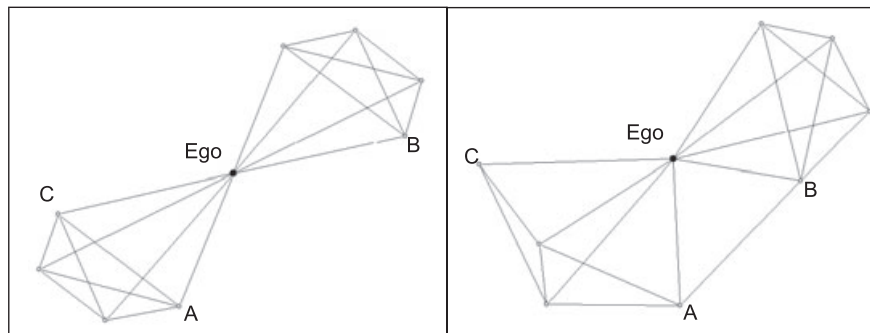
Figure 1 Social networks A and B with high and low ego network betweenness. Black circles indicate egos and white circles indicate friends of the egos. Lines represent relationships (ties) among the egos and the friends. Each network is composed of an ego, eight friends, and 12 ties between the friends. In network A, ego network betweenness is 16.00. In network B, ego network betweenness is 12.83.

network indices were used to measure closure of egocentric networks.

The first is the 'ego network density' index. In an ego-centric network, the number of closed triads including the ego is represented as the number of ties between friends, which directly corresponds with the density of the network. Ego network density, denoted by d, is simply defined as the proportion of existing ties to possible ties in an egocentric network:

$$d = 2F/[n(n-1)] \qquad (1)$$

where F is the number of ties between friends of the ego and n is the number of friends in the network. According to Heider (1958) and Coleman (1988), it is assumed that higher ego network density implies greater closure of the network.

The other is the 'ego network betweenness' index proposed by Everett and Borgatti (2005). This measure assesses the connectivity of egocentric networks, indicating the extent to which the ego has a brokerage opportunity created by a lack of connection between separate cliques in the network. Ego network betweenness corresponds to the 'effective size' index (Burt, 1993), or structural holes, which refers to the degree to which ego possesses broker-age position within the cohesive egocentric network (Gargiulo & Benassi, 2000; Marsden, 2002). The degree of embedded structural holes in a network was negatively related to closure of the network (Burt, 2001). Thus, the maximum value of ego network betweenness is obtained in a network without closure, or an egocentric 'star network' in which only the ego holds all direct connections with his or her friends who have no direct friendship ties; the minimum ego-betweenness value can be found in a network with highest closure, where all members, including the ego and his or her friends, are directly connected with each other. High ego network betweenness indicates the open-

ness of the networks with low closure, implying that the ego has a network separated in cliques. In contrast, low ego network betweenness implies high closure of the friendship network, suggesting that, not only the ego, but also some of his or her friends are connected with each other across cliques.

Although ego network betweenness is, in essence, the reverse of ego network density (Marsden, 2002), it is the case that networks with the same number of friends and ties may have different scores of ego network betweenness according to the patterns of connections between friends. Figure 1 shows an example of egocentric Networks A and B. Each network consists of an ego, eight friends, and 12 ties between the friends. In Network A, the friends of the ego are divided into two cliques, and the ego only connects these cliques. Ego network betweenness of Network A results in 16.0 (for a calculation procedure, see Appendix I). There also seem to be two cliques in Network B, but the tie between friend A and friend C is replaced by the tie between friend A and friend B that connects the cliques. As a result, ego network betweenness of Network B decreases to 12.8. From a viewpoint of the ego, it is clear that the latter forms a more closed network than the former, which corresponds to the smaller value of ego network between-ness. Therefore, lower ego network betweenness implies greater closure of the network.

In sum, both ego network density and ego network betweenness measure network closure, where the former counts the proportion of closed triads, and the latter indi-cates the degree of connectivity of the network. The present study assessed network closure from both perspectives.

The relationship between generalized trust and network closure is somewhat difficult to predict. Generalized trust may be associated with a relatively open social network structure. If people with generalized trust seek new social opportunities, they may form social relationships with

people in a variety of contexts. They may make friends with attitudinally similar others anywhere, for instance, at work, in the neighbourhood, and so on. These friends, however, may not know each other, thus resulting in an open social network.

Nonetheless, generalized trust may be positively related to network closure. Consider the following scenario. If a person with generalized trust forms friends with attitudinally similar others as we discussed earlier, these friends are likely to become friends with each other for various reasons. First of all, the person with generalized trust provides opportunities for his or her friends to interact with each other. Such interaction opportunities enable these attitudinally similar friends to become friends with each other as well. In addition, according to balance theory (Heider, 1958), these friends may develop mutual friendships to complete a balanced triangle. As Granovetter (1973) noted, strong friendship ties tend to become closed; a person with high generalized trust, then, may act as glue for social connectivity.

Furthermore, Coleman (1988) suggested that closed networks tend to generate high trust. If one's friends know each other (i.e. high closure), how one interacts with a friend, honourably or dishonourably, is likely to be known to those who make friends with that particular friend. Those other friends may trust one if he or she deals with his or her friends honourably. If one's interaction with his or her friends is dishonourable, however, this information would harm one's reputation, and one may even be punished for bad behaviour. In the presence of potential damage to reputation (Burt, 2001) and expected sanctions (Granovetter, 1985), a person who is in a closed network would behave honourably. This system is likely to generate trust. If reputation and sanction are conceptualized in terms of resource exchange, as Yamagishi and Cook (1993) noted, in a social network, generalized trust and generalized resource exchange mutually and dynamically reinforce each other.

Cultural comparative perspective

Cross-cultural comparisons in social psychology have been dominated by a contrast between Eastern and Western cultures, especially East Asia and North America. Primarily concentrating on individualism, collectivism, and related constructs (Triandis, 1989, 1995; Markus & Kitayama, 1991), many of these studies conducted two-culture comparisons between one East Asian and one Western European based as representatives of Eastern and Western cultures (for a review see Oyserman, Coon, & Kemmelmeier, 2002). Whereas stereotypes may suggest that collectivist Eastern cultures may show higher levels of generalized trust and relationism than individualist Western cultures, the past research has shown otherwise, pointing to some complex social psychological processes that may be responsible for cultural differences in trust and social networks.

First, in terms of generalized trust, two of the East Asian cultures, Japan (Yamagishi & Yamagishi, 1994) and Korea (Kim & Son, 1998), showed lower generalized trust than the USA. According to Yuki and colleagues (Yuki, 2003; Yuki, Maddux, Brewer, & Takemura, 2005), Easterners' and Westerners' trust of strangers is generated on the basis of different processes. As for relationism, which is conceptually distinct from individualism and collectivism (Kashima & Hardie, 2000), Kashima *et al*. (1995) reported that although Koreans are higher in relationism than Western cultures (USA and Australia), Japanese exhibit lower levels of relationism than Western cultures. This latter finding was also replicated in another cross-cultural study using different operationalizations (Uleman *et al*., 2000).

Cross-cultural studies of social networks are not numerous. Satterwhite, Feldman, Catrambone, and Dai's (2000) study suggests cultural differences in network homogeneity. They found that Americans may have a greater number of friends whose attitudes are similar than Japanese and Taiwanese. Schug *et al*. (unpubl. data, 2007) also revealed that Americans tended to evaluate their friends as more similar than Japanese, and this cultural difference was mediated by relationship mobility in society. However, little research has examined cultural difference in network closure.

In the present study, we examined generalized trust and relationism in relation to network homogeneity and closure in two English-speaking (Australia and the UK), one continental Western-European (Germany), and two East Asian (Japan and Korea) cultures. We hypothesized that people with high generalized trust may have social networks with high closure, whereas those with high relationism may possess social networks with high self-other similarity. Nonetheless, these hypothesized relations may or may not be able to explain cultural differences in network structures. We sought to investigate these questions across the five cultures.

Methods

Participants

A total of 572 university students participated in this study that formed a part of a larger research project. The participants included 136 Australians (41 males and 95 females) from Melbourne, 70 British (14 males and 56 females) from Falmer, 110 Germans (25 males and 85 females) from Würzburg, 92 Japanese (48 males and 44 females) from Tokyo, and 115 Koreans (46 males and 69 females) from Seoul. Age of all participants was between 17 and

25 years, with an average of 18.8 years in Australia, 20.5 years in the UK, 21.1 years in Germany, 20.8 years in Japan, and 20.3 years in Korea. All participants in Japan, Korea and Germany were native born. The Australian and UK samples each involved a small proportion (15%) of individuals with non-Anglo-Celtic, non-Western-European background, but none were of Asian background. The cities of Melbourne, Tokyo, and Seoul are located in metropolitan areas, whereas Würzburg is a regional city and Falmer, where the UK participants were sampled, is located near a regional city.

Measures

Data were collected as part of a larger study. Other aspects of the data have been published in Kashima *et al.* (2004a). The present paper reports one aspect of the data from a questionnaire pertaining to social networks. The first section of this questionnaire consisted of friendship network assessment scales. Participants were asked to list up to eight of their friends, and then answer whether these people were friends with each other. This network was an egocentric network in which all network members were directly connected with participants (egos). Then, to measure similarity of attitudes between participants and their friends, they were asked to rate the extent to which they perceived themselves to be similar 'in terms of opinions about various things in life' with each of the friends using a five-point scale that ranges from 1 'different' to 5 'similar'. Most participants listed eight friends (i.e. a maximum size of friendship networks under this measure) across cultures, but there was a significant cultural difference in network size, $F_{4,519} = 4.11$, $p < 0.01$. Australians had a greater number of friends ($M = 7.91$) than Germans ($M = 7.56$). Nonetheless, large proportions of participants listed the maximum number (i.e. eight) of friends in all countries: Australians (95.6%), British (91.5%), Germans (82.7%), Japanese (88.0%), and Koreans (93.9%).

The second section of the questionnaire was concerned with individual dispositions about interpersonal relationships. Relationism (Kashima *et al.*, 1995) was measured by seven items, using a five-point scale that ranges from 1 'strongly disagree' to 5 'strongly agree'. Generalized trust (Yamagishi & Yamagishi, 1994) was measured by five items using the same five-point scale. The items of both measures are presented in Appendix II. Cronbach's alpha coefficients for relationism and generalized trust were, respectively, 0.73, and 0.82 in Australia, 0.74, and 0.80 in the UK, 0.75, and 0.78 in Germany, 0.77 and 0.70 in Japan, and 0.60, and 0.54 in Korea. Given the relatively low reliability in Korea, results need to be interpreted with caution.

Friendship network indices

Similarity of friendship ties. Friendship network ties were classified in terms of the perceived similarity between participants and their friends: 'similar ties' consisted of the relationships with friends whose similarity to participants was rated 4 or 5. The number of similar ties served as a measure of network homogeneity.[1]

Ego network density and betweenness. Ego network density was calculated based on Equation 1. Ego network betweenness was computed by the procedure reported in Appendix I. These indices were used as measures of network closure.

Results

To examine the cultural differences in the relations of generalized trust and relationism with friendship networks, data analyses were divided into two parts. First, we examined cultural differences in trust variables (generalized trust and relationism) as well as network characteristics. Second, the relations of generalized trust and relationism with number of similar friends and ego network density and betweenness were examined.

Prior to analyses, we set four meaningful cultural contrasts to investigate cross-cultural differences. The contrast coefficients are listed in Table 1. The first variable contrasted Western cultures against Eastern cultures; the second contrasted English-speaking cultures against Germany; the third contrasted the two English-speaking cultures, Australia and the UK; and the fourth contrasted the two East Asian cultures, Japan and Korea.

Cultural differences

Generalized trust and relationism. Table 2 reports the mean values of generalized trust and relationism. In order to find cultural differences, generalized trust was subjected to a multiple regression analysis with gender, the four cultural contrasts, and four interactions between gender and each contrast as predictors. The total amount of these

Table 1 Cultural contrasts used for the analyses

	Australia	UK	Germany	Japan	Korea
East-West	1	1	1	−1.5	−1.5
English-German	1	1	−2	0	0
Australia-UK	1	−1	0	0	0
Japan-Korea	0	0	0	1	−1

Table 2 Mean values of generalized trust and relationism, and correlations between them across the five cultures

	Australia	UK	Germany	Japan	Korea
Generalized trust	3.46	3.33	3.22	2.89	3.85
Relationism	3.82	3.93	3.78	3.59	3.98
r	−0.04	0.19	0.08	−0.27**	0.35**

**$p < 0.01$.

effects was significant, $R^2 = 0.23$, $F_{9,513} = 31.50$, $p < 0.01$. No gender difference was found in the level of generalized trust. Although there was no significant East-West difference, the English-Germany contrast, $t_{513} = 2.47$, $\beta = 0.10$, $p < 0.01$, and the Japan-Korea contrast, $t_{513} = -11.60$, $\beta = -0.45$, $p < 0.01$, were significant. Germans showed a lower level of generalized trust than those in the English-speaking countries, whereas Koreans showed a higher level of generalized trust than did Japanese. Meanwhile, the interaction of gender × the East-West contrast was significant, $t_{513} = 2.00$, $\beta = 0.05$, $p < 0.01$. In Western countries, males ($M = 3.46$) were slightly more trustful than females ($M = 3.31$), $t_{314} = 1.99$, $p < 0.05$. However, in East Asian countries, males ($M = 3.37$) and females ($M = 3.47$) were similarly trustful, $t_{205} = -0.87$, ns.

In terms of relationism, a comparable analysis showed that the total amount of gender, the cultural contrast, and the interaction effects were also significant, $R^2 = 0.34$, $F_{9,511} = 13.37$, $p < 0.01$. There was significant gender differences in relationism, $t_{517} = 6.41$, $\beta = 0.40$, $p < 0.01$. Of the four contrasts, only the Japan-Korea contrast was significant, $t_{517} = 3.86$, $\beta = 0.40$, $p < 0.01$. Replicating Kashima *et al*. (1995), females were more relational than males, and Koreans were more relational than Japanese. No significant interaction effects between gender and the cultural contrasts were found.

We also explored the association between generalized trust and relationism, which may differ across cultures (Table 2). A multiple regression analysis on generalized trust was conducted with relationism, the four cultural contrasts, and the interaction effects between relationism and each of the contrasts as predictors. Only the interaction between relationism and the Japan-Korea contrast was significant, $t_{512} = -4.17$, $\beta = -0.16$, $p < 0.01$. A simple slope analysis showed that the relationship between relationism and generalized trust was significantly negative for Japanese, but positive for Korean. There were no significant correlations between generalized trust and relationism in Western countries.

Network homogeneity. Figure 2 shows the mean number of similar ties in each gender and culture. A multiple regres-
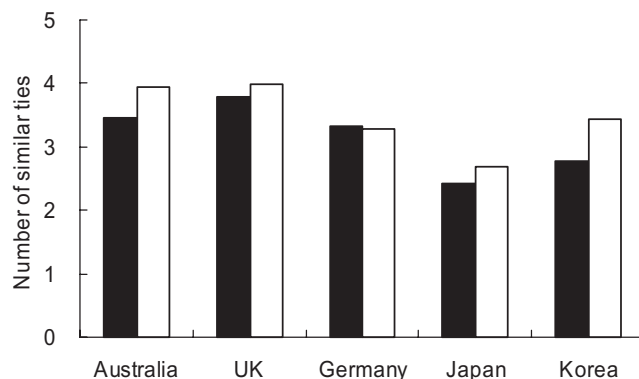

Figure 2 Number of similar ties in Australia, the UK, Germany, Japan and Korea. ■, Male; □, female.

Table 3 Gender and cultural effects on the number of similar ties

	β
Gender	0.08*
Cultural contrasts	
East-West	0.21**
English-German	0.14**
Australia-UK	−0.09*
Japan-Korea	−0.10*
Interaction effects	
Gender × East-West	−0.09*
Gender × English-German	−0.02
Gender × Australia-UK	0.23**
Gender × Japan-Korea	−0.01
R^2	0.13**

**$p < 0.01$, *$p < 0.05$.

sion analysis on the number of similar ties with gender (males and females), four cultural contrasts (East-West, English-German, Australia-UK, and Japan-Korea) and interaction effects of gender and each of the four contrasts was conducted to examine the difference in network homogeneity across gender and the cultures.

As shown in Table 3, a main effect of gender was significant, implying that females were more likely to have similar ties than males. However, this gender difference was qualified by culture. Two interaction effects between gender and the cultural contrasts were significant. First, the gender × East-West contrast was significant. In the East Asian countries, females had a greater number of similar friends than males, whereas in the Western countries, there was no gender difference in the number of similar ties. Furthermore, within the Western countries, the significant interaction due to gender × the Australia-UK contrast qualified the main effect of the Australia-UK contrast. The
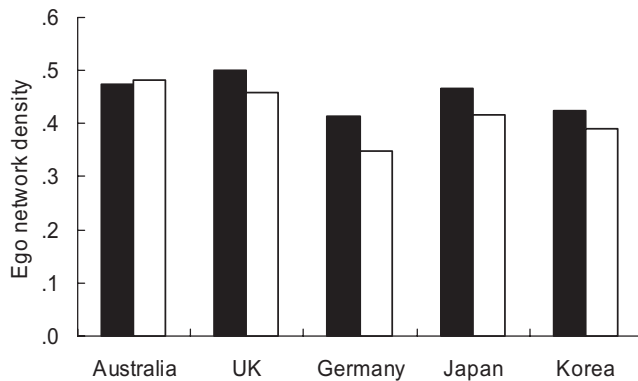
Figure 3 Ego network density in Australia, the UK, Germany, Japan and Korea. ■, Male; □, female.

Figure 4 Ego network betweenness in Australia, the UK, Germany, Japan and Korea. ■, Male; □, female.

gender difference was more pronounced in Australia than in the UK.

There were also significant main effects of the cultural contrasts. First, the East-West contrast was significant. Compared with Easterners, Westerners had more similar ties. Nonetheless, this global East-West comparison needs to be qualified by three additional effects. Within English-speaking cultures, the Australian-UK contrast was significant: British had more similar ties than Australian. Within Western cultures, the English-German contrast was significant as well: English speakers had more similar ties than Germans. Within Eastern cultures, the Japan-Korea contrast was significant, suggesting that Koreans had a greater number of similar ties than Japanese.

Network closure. Figure 3 shows the mean values of ego network density. A comparable analysis showed that the model including gender, the cultural contrast, and the inter-actions effects was significant, $R^2 = 0.05$, $F_{9,513} = 3.27$, $p < 0.01$. The English-German contrast was only a significant predictor of ego network density, $t_{513} = 4.04$, $\beta = 0.17$, $p < 0.01$. In terms of triads, Germans had less closed social networks than Australians and British. Neither a gender main effect nor other interaction effects were significant.

The mean values of ego network betweenness across gender and cultures are presented in Figure 4. The model including gender, the cultural contrast, and the interactions effects was significant, $R^2 = 0.08$, $F_{9,513} = 5.27$, $p < 0.01$. Whereas no significant effects were found in gender and the interactions, the East-West contrast was significant, $t_{513} = -2.03$, $\beta = -0.09$, $p < 0.05$. With regard to the connectivity of networks, the Western cultures were more likely than the Eastern cultures to have networks with high closure. The English-German contrast was also a significant predictor of ego network betweenness, $t_{513} = -5.61$, $\beta = -0.24$, $p < 0.01$. Germans had less connected social networks than Australians and British.
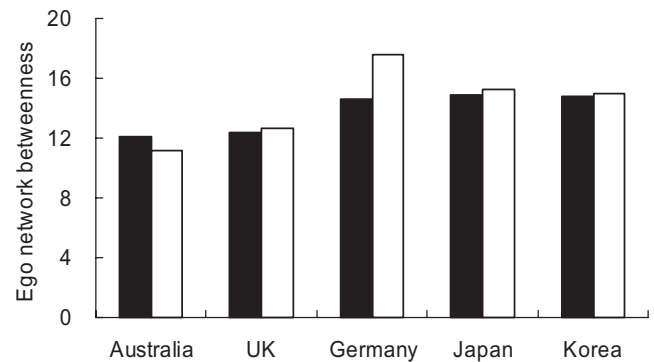
Cultural differences in the associations between trust and network properties

We used hierarchical multiple regression analysis to examine the associations of trust with network properties.[2] In line with Kashima *et al.* (2004a), the following data analytical strategy was used. At the first step, the four cultural contrasts were included in the model to compare the mean value of each of the dependent variables (the number of similar ties, ego network density, and ego network betweenness) among the cultures; in the second step, generalized trust and relationism, centred by sub-tracting the mean value from each observed value (Aiken & West, 1991), were added to the analysis; and finally, four three-way interaction effects of generalized trust × relationism × each of the four cultural contrasts, four two-way interaction effects of generalized trust × the four contrasts, four two-way interaction effects of relationism × the four contrasts, and one two-way interaction effect of generalized trust × relationism were included as predictors. Each three-way interaction was entered into the model separately. If a three-way interaction was significant, two-way interactions involved in this three-way interaction were retained. Non-significant interaction effects were excluded from the further analyses. We also conducted the same analyses while controlling for gender, but this did not affect the results, and none of the interaction effects involving gender was significant. Thus, in the present paper, we present the results without gender.

Network homogeneity. Table 4 reports the results of multiple regression analyses on the number of similar ties. The first step replicated the results we reported earlier: the East-West, English-speaking-Germany, and Japan-Korea contrasts were all significant. At the second step, a main effect of relationism was positively significant, whereas generalized trust was marginally significant. Interestingly, the

Table 4 Standardized coefficient values of hierarchical multiple regression analyses on the number of similar ties

	No. similar ties		
	Step 1	Step 2	Step 3
Cultural contrasts			
East-West	0.23**	0.23**	0.23**
English-German	0.13**	0.11**	0.11**
Australia-UK	−0.03	−0.03	−0.02
Japan-Korea	−0.11**	−0.06	−0.03
Individual dispositions			
Generalized trust		0.08***	0.08***
Relationism		0.11**	0.12**
Interaction effects			
Relationism × East-West			−0.08***
Generalized trust × Relationism			0.10*
Generalized trust × Relationism × English-German			0.12**
R^2	0.07**	0.09**	0.12**
R^2 change		0.02**	0.03**

$**p < 0.01$, $*p < 0.05$, $***p < 0.10$.

effect of the Japan-Korea contrast became non-significant in the second step when generalized trust and relationism were included, suggesting that the cultural difference between Japan and Korea can be explained by generalized trust, relationism, or both. To examine which of the trust variables accounted for the Japan-Korea cultural difference, the number of similar ties was regressed on the Japan-Korea contrast as well as generalized trust or relationism, separately. Results showed that not relationism, but generalized trust, made the contrast effect disappear. As reported earlier, Koreans showed higher generalized trust than did Japanese. Furthermore, generalized trust was positively correlated with the Japan-Korea contrast, $r = 0.42$, $p < 0.01$; that is, the differences in the numbers of similar ties between Japanese and Koreans would be explained by the difference in generalized trust.

At the third step of the hierarchical regression analysis, the three-way interaction effects (generalized trust × relationism × each of the cultural contrasts) and the two-way interaction effects involved in the three-way interactions were added simultaneously to the analysis. Only a three-way interaction among generalized trust × relationism × the English-German contrast was significant. At the same time, the two-way interaction of generalized trust × relationism was significant, although neither the interactions of generalized trust × the contrasts nor relationism × the contrasts were significant. Moreover, while controlling for the three-way interaction of the English-German contrast, relationism significantly interacted with the East-West contrast. This pattern of results suggested that the relations of generalized trust and relationism with similar ties differed among English-speaking countries, Germany, and East Asian countries.

Table 5 Effects of generalized trust, relationism, and their interaction on the number of similar ties

	English-speaking countries	Germany	East Asian countries
Generalized trust	0.08	0.22**	0.05
Relationism	0.04	0.09	0.21**
Generalized trust × Relationism	0.22**	−0.10	0.11
R^2	0.06**	0.08**	0.06**

$**p < 0.01$.

To clarify these complex relations, multiple regression analyses by generalized trust, relationism, and the generalized trust × relationism interaction were conducted on the number of similar ties in the English-speaking countries, Germany, and the East Asian countries, respectively. As Table 5 shows, the interaction of generalized trust × relationism was only significant in the English-speaking countries. Simple slope analyses revealed that the regression slope of the number of similar ties was significantly positive at one standard deviation above the mean of centred generalized trust ($\beta = 0.23$, $p < 0.01$), but non-significant at one standard deviation below ($\beta = 0.03$, ns). In Germany, however, generalized trust was only a significant predictor of the number of similar ties, whereas in the East Asian countries, only relationism was significant.

To summarize, relationism increased the number of similar ties only if people had high generalized trust in English-speaking countries. Generalized trust increased the

Table 6 Correlations between network characteristics

	No. similar ties	Ego network density
Ego network density	0.01	–
Ego network betweenness	−0.11*	−0.89**

**p < 0.01, *p < 0.05.

Table 7 Standardized coefficient values of hierarchical multiple regression analyses on ego network density

	Ego network density	
	Step 1	Step 2
Cultural contrasts		
East-West	0.03	0.03
English-German	0.19**	0.18**
Australia-UK	0.02	0.01
Japan-Korea	0.06	0.09***
Individual dispositions		
Generalized trust		0.08***
Relationism		−0.03
No. similar ties		−0.02
R^2	0.04**	0.05**
R^2 change		0.01

**p < 0.01, ***p < 0.10.

Table 8 Standardized coefficient values of hierarchical multiple regression analyses on ego network betweenness

	Ego network betweenness	
	Step 1	Step 2
Cultural contrasts		
East-West	−0.08***	−0.07*
English-German	−0.25**	−0.23**
Australia-UK	−0.05	−0.04
Japan-Korea	0.00	−0.05
Individual dispositions		
Generalized trust		−0.09*
Relationism		−0.01
No. ties		−0.05
R^2	0.08**	0.09**
R^2 change		0.01

**p < 0.01, *p < 0.05, ***p < 0.10.

number of similar ties among Germans, whereas relationism increased the number of similar ties among East Asians.

Network closure. Prior to analyses, we calculated the correlation between the number of similar ties and ego network density and betweenness as reported in Table 6. As ego network betweenness was negatively correlated with the number of similar ties, homogeneity, aside from relationism and generalized trust, might be a significant predictor of network connectivity by virtue of homophilous attraction between similar friends. In order to examine this alternative explanation, the number of similar ties was included in a series of multiple regression analyses as a predictor of ego network betweenness and density. The number of similar ties did not predict network closure under controlling for generalized trust and relationism, implying that network closure regarding trust would be independent of the process of homophilous attraction.

Table 7 represents the results of multiple regression analyses on ego network density. The English-German contrast was significant in the first step, corresponding with the result reported earlier. After controlling for the cultural contrasts, generalized trust and relationism were included in the second step. As hypothesized, generalized trust was a marginally significant predictor of ego network density. Participants with high generalized trust were likely to have more closed friendship networks with a greater number of triads. Relationism and interaction effects were not significant.

As in Table 8, the results of the analyses on ego network betweenness were consistent with those on ego network density. The East-West contrast and the English-German contrast were significant in the first step, as in the former result. Along with ego network density, only generalized trust significantly increased ego network betweenness in the second step. Participants with high generalized trust tended to connect cliques of friends, and have more closed networks.

Discussion

The present paper examined trust and social network characteristics in five countries. We argued that there may be two different types of trust: one is generalized trust about people in general, and the other is trust directed towards someone more specific, which is related to relationism. We suggested that they may show some theoretically expected relations with network characteristics of homogeneity and closure. We should note from the outset that cultural main effects are difficult to interpret because they may reflect a great number of sociocultural differences such as educational system, regional differences such as collective self and social capital (Putnam, 2000; Kashima *et al.*, 2004b), and methodological artifacts such as response sets. In con-

trast, the relations between trust and networks are less likely to be prone to the methodological problems.

Even with these caveats, we may be able to draw two general conclusions. First, generalized trust is consistently positively related to network closure: high generalized trust is associated with greater network closure. Given the cross-sectional nature of the data, it is difficult to draw a causal inference. As Coleman and others have noted, closed networks may foster higher trust. In contrast, generalized trust may promote the formation of friendship ties; friends of a friend may then form friendship ties, facilitating network closure. Whatever is the process (or perhaps both are involved), this cross-cultural stability of the relation between generalized trust and network closure is remarkable.

Second, despite the general emphasis on the East-West cultural differences, there is significant cultural variability within East Asian and Western cultures, especially between Japan and Korea, and between English-speaking countries and Germany. In the following, we will draw out these cultural differences by mainly focusing on relations among trust and network characteristics.

East Asia

First, in East Asia, there is an intriguing commonality: relationism is positively related to network homogeneity, but generalized trust is unrelated to it. If our reasoning is right – generalized trust may relate to relationship formation, but relationism may be associated with relationship maintenance – the pattern may be interpreted as suggesting that what matters in network homogeneity is whether people are good at keeping friends, rather than whether they can make friends. To put it differently, the results may be paraphrased as showing that the tendency to make friends with attitudinally similar others does not play an important role in East Asian social networks.

This pattern may be interpretable within Nakane's (1967) the theoretical framework of Japanese culture. According to Nakane, in Japan, there is a strong norm of forming social relationships among those who share what she called *ba* (literally translated as field, as in magnetic field). *Ba* may be defined as a type of behavioural setting, in which people have frequent (even daily) interactions, usually, though not always, with a shared goal. A company is an example; an educational setting is an equivalent example for students. If there is a strong norm to form friendship ties with those who are in the same setting in Japan, generalized trust may be irrelevant for friendship formation; it is just that relational people may end up retaining friends who have similar attitudes. Nakane argued that her theory may be generalized to other societies where their cultural compositions are homogeneous. Korea would be another country in East Asia, where its ethnic composi-

tion is as homogeneous as Japan. This line of reasoning suggests that the relationism-network homogeneity relation may hold in Japan and Korea, but not necessarily in other parts of East Asia where society is not homogeneous.

Nonetheless, there is an intriguing cultural difference between Japan and Korea. Koreans showed high generalized trust and relationism, whereas Japanese were lower on both. Furthermore, generalized trust and relationism are positively correlated in Korea, but they are negatively correlated in Japan. This may be interpreted in terms of the prevalence of Confucianism in these countries. The central concept in Confucianism is *ren* (in Chinese, but pronounced as *in* in Korean and *jin* in Japanese), which Kashima *et al*. (2004b) argued may act to raise relationism. After all, *ren* is a complex moral precept in which people are encouraged to relate to others with humanity and care (Chan, 1963; Li, 1999). Nonetheless, there is an element of generalized trust (i.e. human nature is good) in the Confucian concept of *ren*. Confucianism appears to be more prevalent and influential in Korean than in Japan (Robinson, 1991; Rozman, 1991). Therefore, the concept of *ren* (or *in*) may act to produce a positive correlation between generalized trust and relationism, as well as higher levels in these orientations in Korea relative to Japan.

Even so, the negative relation between relationism and generalized trust in Japan is hard to explain and left uninterpreted. Kashima *et al*. (1995) and Kashima *et al*. (2004b) offered some speculations about the effect of historical events, especially the defeat in WWII, to explain the extremely low level of relationism. Whether it can explain the pattern of findings in Japan remains to be seen. Further research needs to be conducted in this regard.

Western European-based countries

English-speaking countries and Germany show a number of cultural differences in trust and social network characteristics. First of all, English-speaking countries were high in generalized trust, network homogeneity, and network closure. Furthermore, the generalized trust × relationism effect on network homogeneity suggests that relationism increased homogeneity when generalized trust was high. This effect was not present elsewhere. This pattern may be interpretable as suggesting that people need to work at both forming and maintaining social relationships with attitudinally similar others in English-speaking countries. In East Asia, people may not need to work at forming relationships because the fact of belonging to a same behavioural setting (*ba*) is a strong enough determinant of relationship formation; however, they need to work at retaining relationships by establishing relational commitment with particular others. It may be the case that, in Australia and the UK (and possibly other English-speaking countries such as the USA,

Canada and New Zealand), people need to have attitudes conducive to making friends (generalized trust) and retaining them (relationism) to hold attitudinally homogeneous social networks.

In Germany, in contrast, generalized trust did, but relationism did not, predict network homogeneity. Germans showed lower levels of generalized trust than English speakers. Further, given their levels of generalized trust, German levels of network closure was low relative to other countries. Factors other than trust may explain their low network closure. The higher level of openness to experience among Germans (McCrae & Terracciano, 2005) may be one of the factors, although it may be somewhat contrary to their lower level of generalized trust. Institutional factors such as how university students are selected may also be relevant. Further research is clearly needed to find more specific cultural variation within Western European-based cultures.

Trust and social relationships across cultures

If the interpretations outlined above are anywhere near the mark, trust and social network characteristics may be linked by mechanisms that are largely stable across cultures. Namely, generalized trust may facilitate relationship formation, whereas relationism may secure relationship maintenance. People with high generalized trust can approach and make friends with others especially if they share similar attitudes in life; relationism would foster close relationships with those who have a similar outlook on life once they are established. In this framework, differences in relations between trust and network characteristics may result from whether people's personal characteristics such as generalized trust and relationism have an opportunity to make a difference.

In English-speaking cultures, generalized trust may be related to the creation of social opportunities. When people have high generalized trust and, therefore, can form social relationships, the more relational of them have a greater number of attitudinally similar friends. Generalized trust may encourage people to seek new social relationships; however, once contacts are made and relationships are initiated, stronger relationships are maintained by relationism. By contrast, in East Asia, generalized trust may not be related to the creation of social opportunities. Instead, social institutions, including university settings, provide a normative expectation that those who belong to the same setting form social relationships (Nakane, 1967). In this type of social arrangement, relationism may be particularly predictive of the retention of social networks consisting of strong, committed friends with homogeneous attitudes, but generalized trust may not play a major role in the formation of social relationships.

Nevertheless, this does not mean that differences across countries are all explainable in terms of the universal psychosocial mechanisms and social institutional arrangements. Such issues as the relation between two types of trust may require explanations by cultural elements such as the Confucian concept of *ren* and their distribution in a country.

Concluding remarks

Cross-cultural research in psychological mechanisms and social network characteristics provides a unique opportunity to construct and test broad theories about the connection among the psychological, social, and cultural processes at work. In the present paper, we identified some of the cross-cultural similarities as well as differences in the relations between trust and social networks. Although generalized trust's positive relation with network closure was found across all countries, there were some differences between East Asian and Western-European based cultures, as well as more subtle cultural and societal differences within East Asia and within the West. The results caution against the often practiced generalization of findings from one of the cultures (e.g. Korea, Japan) to the whole of the East or the West. A more differentiated understanding of Eastern and Western cultures may need to be sought.

Acknowledgements

End notes

1. The proportion of the number of similar ties to friendship network size was considered to be another index of network homogeneity. The analyses on this index, however, yielded the same significant results as those on the number of similar ties. The latter results are therefore only reported here.
2. In this study, the size of friendship networks was restricted up to eight. This restriction might cause crucial statistical problems that the number of similar ties did not fulfil the assumption of normality and, therefore, ordinary least squares (OLS) multiple regression analyses on the number of similar ties overestimated standard errors. To tackle these problems, we

conducted permutation-based non-parametric multiple regression analyses in line with the same data analytical strategies as reported here. As the results of non-parametric regression analyses were quite similar to those of the OLS regression analyses, we only report the results of OLS regression (we thank Johan Koskinen for this suggestion).

References

Aiken, L. S. & West, S. G. (1991). *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park, CA: Sage.

Andersen, S. L. & Chen, S. (2002). The relational self: An interpersonal social-cognitive theory. *Psychological Review, 104,* 619–645.

Baumeister, R. F. & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117,* 497–529.

Bonacich, P., Oliver, A. & Snijders, T. A. B. (1998). Controlling for size in centrality scores. *Social Networks, 20,* 135–141.

Brewer, M. B. (1979). In-group bias in the minimal intergroup situation: A cognitive-motivational analysis. *Psychological Bulletin, 86,* 307–324.

Brewer, M. B. & Gardner, W. L. (1996). Who is this 'we'?: Levels of collective identity and self representations. *Journal of Personality and Social Psychology, 71,* 83–93.

Burt, R. S. (1993). *Structural Holes*. Cambridge, MA: Harvard University Press.

Burt, R. S. (2001). Structural holes versus network closure as social capital. In: N. Lin, K. S. Cook & R. S. Burt, eds. *Social Capital: Theory and Research*, pp. 31–56. New York: Aldine de Gruyter.

Buskens, V. (1998). The social structure of trust. *Social Networks, 20,* 265–289.

Byrne, D. (1971). *The Attraction Paradigm*. New York: Academic Press.

Byrne, D., Ervin, C. R. & Lamberth, J. (1970). Continuity between the experimental study of attraction and real life computer dating. *Journal of Personality and Social Psychology, 16,* 157–165.

Chan, W.-T. (1963). *A Source Book in Chinese Philosophy*. Princeton, NJ: Princeton University Press.

Coleman, J. (1988). Social capital in the creation of human capital. *American Journal of Sociology, 94,* 95–120.

Cook, K. S. & Cooper, R. M. (2001). Experimental studies of cooperation, trust, and social exchange. In: E. Ostrom & J. Walker, eds. *Trust and Reciprocity: Interdisciplinary Lessons from Experimental Research*, Vol. VI, pp. 209–244. New York: Russell Sage Foundation.

Cross, S. E. & Madson, L. (1997). Models of the self: Self construals and gender. *Psychological Bulletin, 122,* 5–37.

Duck, S. (1975). Personality similarity and friendship choices by adolescents. *European Journal of Social Psychology, 5,* 351–365.

Freeman, L. C. (1979). Centrality in social networks: Conceptual clarification. *Social Networks, 1,* 215–239.

Everett, M. & Borgatti, S. P. (2005). Ego network betweenness. *Social Networks, 27,* 31–38.

Gargiulo, M. & Benassi, M. (2000). Trapped in your own net? Network cohesion, structural holes, and the adaptation of social capital. *Organization Science, 11,* 183–196.

Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology, 78,* 1360–1380.

Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology, 91,* 481–510.

Hamaguchi, E. (1977). *Nihonrashisa no saihakken [A Rediscovery of Japaneseness]*. Tokyo: Nihon Keizai Shinbunsha.

Hardin, R. (2001). Gaming trust. In: E. Ostrom & J. Walker, eds. *Trust and Reciprocity: Interdisciplinary Lessons from Experimental Research*, Vol. VI, pp. 80–102. New York: Russell Sage Foundation.

Hayashi, N., Ostrom, E., Walker, J. & Yamagishi, T. (1999). Reciprocity, trust, and the sense of control: A cross-societal study. *Rationality and Society, 11,* 27–46.

Heider, F. (1958). *The Psychology of Interpersonal Relations*. Hoboken, NJ: Wiley.

Hogg, M. A., Abrams, D., Otten, S. & Hinkle, S. (2004). The social identity perspective: Intergroup relations, self-conception, and small groups. *Small Group Research, 35,* 246–276.

Kalish, Y. & Robins, G. L. (2006). Psychological predispositions and network structure: The relationship between individual predispositions, structural holes and network closure. *Social Networks, 28,* 56–84.

Kashima, E. S. & Hardie, E. A. (2000). The development and validation of the relational, individual, and collective self-aspects (RIC) scale. *Asian Journal of Social Psychology, 3,* 19–48.

Kashima, Y., Kashima, E. S., Farsides, T., Kim, U., Strack, F., Werth, L. *et al.* (2004a). Culture and context-sensitive self: The amount and meaning of context-sensitivity of phenomenal self differ across cultures. *Self and Identity, 3,* 125–141.

Kashima, Y., Kokubo, T., Kashima, E. S., Boxall, D., Yamaguchi, S. & Macrae, K. (2004b). Culture and self: Are there within-culture differences in self between metropolitan areas and regional cities? *Personality and Social Psychology Bulletin, 30,* 816–823.

Kashima, Y., Yamaguchi, S., Kim, U., Choi, S. C., Gelfand, M. J. & Yuki, M. (1995). Culture, gender, and self: A perspective from individualism-collectivism research. *Journal of Personality and Social Psychology, 69,* 925–937.

Kim, Y. & Son, J. (1998). Trust, cooperation and social risk: A cross-cultural comparison. *Korea Journal, 38,* 131–153.

Li, C. (1999). *The Tao Encounters the West: Explorations in Comparative Philosophy*. Albany, NY: State University of New York Press.

Lin, N. (1999). Building a network theory of social capital. *Connections, 22,* 28–51.

McCrae, R. R. & Terracciano, A. (2005). Personality profiles of cultures: Aggregate personality traits. *Journal of Personality and Social Psychology, 89,* 407–425.

McPherson, M., Smith-Lovin, L. & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology, 27,* 415–444.

Markus, H. R. & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion and motivation. *Psychological Review, 98,* 224–253.

Marsden, P. V. (2002). Egocentric and sociocentric measures of network centrality. *Social Networks, 24,* 407–422.

Mehra, A., Kilduff, M. & Brass, D. J. (2001). The social networks of high and low self-monitors: Implications for workplace performance. *Administrative Science Quarterly, 46,* 121–146.

Nakane, C. (1967). *Tatesyakai no ningen kankei [Interpersonal Relationships in the Vertical Society].* Tokyo: Koudansya.

Oyserman, D., Coon, H. M. & Kemmelmeier, M. (2002). Rethinking individualism and collectivism: Evaluation of theoretical assumptions and meta-analyses. *Psychological Bulletin, 128,* 3–72.

Putnam, R. D. (2000). *Bowling Alone: The Collapse and Revival of American Community.* New York: Simon & Schuster.

Robinson, M. (1991). Perceptions of Confucianism in twentieth-century Korea. In: G. Rozman, ed. *The East Asian Region: Confucian Heritage and Its Modern Adaptation*, pp. 204–225. Princeton, NJ: Princeton University Press.

Rotter, J. B. (1971). Generalized expectancies for interpersonal trust. *American Psychologist, 26,* 443–450.

Rozman, G. (1991). Comparisons of modern Confucian values in China and Japan. In: G. Rozman, ed. *The East Asian Region: Confucian Heritage and its Modern Adaptation*, pp. 157–203. Princeton, NJ: Princeton University Press.

Satterwhite, R. C., Feldman, J. M., Catrambone, R. & Dai, L. Y. (2000). Culture and perceptions of self-other similarity. *International Journal of Psychology, 35,* 287–293.

Siegrist, M., Earle, T. C. & Gutscher, H. (2003). Test of a trust and confidence model in the applied context of electromagnetic field (EMF) risks. *Risk Analysis, 23,* 705–716.

Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In: W. G. Austin & S. Worchel, eds. *The Social Psychology of Intergroup Relations*, pp. 33–47. Monterey, CA: Brooks-Cole.

Tanis, M. & Postmes, T. (2005). A social identity approach to trust: Interpersonal perception, group membership and trusting behaviour. *European Journal of Social Psychology, 35,* 413–424.

Triandis, H. C. (1989). The self and social behaviour in differing cultural contexts. *Psychological Review, 96,* 506–520.

Triandis, H. C. (1995). *Individualism and Collectivism.* Boulder, CO: Westview Press.

Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987). *Rediscovering the Social Group: A self-Categorization Theory.* Oxford: Basil Blackwell.

Uleman, J. S., Rhee, E., Bardoliwalla, N., Semin, G. U. & Toyama, M. (2000). The relational self: Closeness to ingroups depends on who they are, culture and the type of closeness. *Asian Journal of Social Psychology, 2,* 1–17.

Yamagishi, T. (1986). The provision of a sanctioning system as a public good. *Journal of Personality and Social Psychology, 51,* 110–116.

Yamagishi, T. (1998). *Shinrai no kouzou: kokoro to syakai no shinka gemu [The Structure of Trust: The Evolutionary Games of Mind and Society].* Tokyo: Tokyo University Press.

Yamagishi, T. & Cook, K. S. (1993). Generalized exchange and social dilemmas. *Social Psychology Quarterly, 56,* 235–248.

Yamagishi, T., Cook, K. S. & Watabe, M. (1998). Uncertainty, trust and commitment formation in the United States and Japan. *American Journal of Sociology, 104,* 165–194.

Yamagishi, T., Kikuchi, M. & Kosugi, M. (1999). Trust, gullibility, and social intelligence. *Asian Journal of Social Psychology, 2,* 145–161.

Yamagishi, T. & Kiyonari, T. (2000). The group as the container of generalized reciprocity. *Social Psychology Quarterly, 63,* 116–132.

Yamagishi, T. & Yamagishi, M. (1994). Trust and commitment in the United States and Japan. *Motivation and Emotion, 18,* 129–166.

Yuki, M. (2003). Intergroup comparison versus intragroup relationships: A cross-cultural examination of social identity theory in North American and East Asian cultural contexts. *Social Psychology Quarterly, 66,* 166–183.

Yuki, M., Maddux, W. W., Brewer, M. B. & Takemura, K. (2005). Cross-cultural differences in relationship- and group-based trust. *Personality and Social Psychology Bulletin, 31,* 48–62.

Appendix I

Calculating ego network betweenness

The ego network betweenness index is calculated in the following procedure (for details, see Everett & Borgatti, 2005, pp. 33–34). Freeman (1979) proposes the concept of 'betweenness centrality' that indicates the extent to which an individual is between all other individuals in the network. Let the shortest paths between two individuals in a network be termed geodesics. A socio-matrix for dichotomous relationships is termed an adjacency matrix, composed of the elements regarding the presence (1) and the absence (0) of the relationships. Betweenness centrality of an adjacency matrix of a symmetric (undirected) complete network is then calculated as:

$$C_B(n_i) = \sum_{j=1}^{N}\sum_{k=1}^{j-1} g_{jk}(n_i)/g_{jk},$$

where N is the size of the network, $g_{jk}(n_i)$ is the number of geodesics connecting n_j and n_k via n_i, and g_{jk} is the total number of geodesics linking n_j and n_k. The value of $g_{jk}(n_i)/g_{jk}$ shows the extent to which individual n_i is between the other two individuals n_j and n_k.

Along with this definition, betweenness centrality of egocentric networks, or ego network betweenness, is defined as follows. A symmetric egocentric network of size $N \times N$ is described as an adjacency matrix **A**, consisting of a focal individual, or an ego, with a set of other individuals who are directly connected with the ego. There is a row and column for each node, and the rows and columns are

Figure 5 Example of an egocentric network and adjacency matrix.
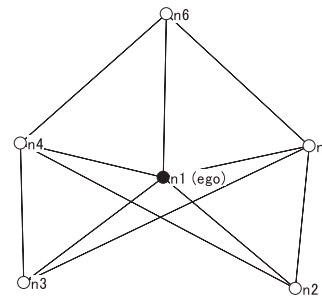
A

	n_1	n_2	n_3	n_4	n_5	n_6
n_1	0	1	1	1	1	1
n_2	1	0	0	1	1	0
n_3	1	0	0	1	1	0
n_4	1	1	1	0	0	1
n_5	1	1	1	0	0	1
n_6	1	0	0	1	1	0

$\mathbf{A}^2_{i,j}$

	n_1	n_2	n_3	n_4	n_5	n_6
n_1	5	2	2	3	3	2
n_2	2	3	3	1	1	3
n_3	2	3	3	1	1	3
n_4	3	1	1	4	4	1
n_5	3	1	1	4	4	1
n_6	2	3	3	1	1	3

$\mathbf{A}^2[\mathbf{1}-\mathbf{A}]_{i,j}$

	n_1	n_2	n_3	n_4	n_5	n_6
n_1	5	0	0	0	0	0
n_2	0	3	3	0	0	3
n_3	0	3	3	0	0	3
n_4	0	0	0	4	4	0
n_5	0	0	0	4	4	0
n_6	0	3	3	0	0	3

labelled 1, 2, . . . , *N*. Let the ego set to the first row and column of **A**, be denoted as the node n_1, while the other individuals are denoted by the nodes n_2 to n_N. As the ego is adjacent to all other nodes in egocentric networks, $\mathbf{A}_{1i} = 1$ and $\mathbf{A}_{i1} = 1$ for $i \geq 2$. In other words, all elements in both the first column and row of **A** are 1, except for the diagonal.

Because all pairs of individuals must be connected with each other through ego, geodesics in the egocentric network must be either of length 1 or 2. Ego network betweenness is based on the number of non-adjacent pairs of individuals (except the ego) indirectly connected with each other. $\mathbf{A}^2_{i,j}$ contains the number of walks of length 2 connecting *i* and *j*, and the number of paths of length 2 for non-adjacent pairs of nodes is given by $\mathbf{A}^2 [\mathbf{1} - \mathbf{A}]_{i,j}$ where **1** is a matrix of all elements 1. Ego network betweenness is therefore calculated as the sum of the reciprocals of the elements above the diagonal. Figure 5 shows an example of an egocentric network and adjacency matrices. Ego network betweenness of this network is $(3 \times 1/3) + (1 \times 1/4) = 1.25$.

Although there is a strong correlation between ego network betweenness and network size (Bonacich, Oliver, & Snijders, 1998), Everett and Borgatti (2005) argued that ego network betweenness should not be normalized by network size. Ego network betweenness is used to determine the connectivity of egocentric networks. The critical idea behind this index is that the larger the network size, the larger the possibility that the members of the network can connect and mediate the other individuals 'outside' of the network. However, normalization ignores this important aspect and, therefore, leads to a loss of information about the nature of the network. Accordingly, following Everett

and Borgatti, this study used ego network betweenness without controlling for the size of the network.

Appendix II

Items of relationism and generalized trust

Relationism (seven items)
1. I often do what I feel like doing without paying attention to others' feelings. (reversed)
2. I often feel sorry for people who look lonely in a gathering and try to talk with them.
3. I am not too concerned about other people's worries. (reversed)
4. I feel like doing something for people in trouble because I can almost feel their pain.
5. I try to put myself in other people's shoes.
6. I believe society cannot be sustained unless we help each other.
7. It doesn't matter whether a person is useful to me; my relationship with the person is important.

Generalized trust (five items)
1. Most people are basically honest.
2. Most people are trustworthy.
3. Most people will respond in kind when they are trusted by others.
4. Most people are basically good and kind.
5. Most people will behave accordingly when trusted by others.