

ORIGINAL ARTICLES

SOCIAL DILEMMA STUDIES

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Abstract: Very often, each individual continues to do something for his/her individual advantage that collectively is damaging to the group as a whole. The conflict is labeled as “social dilemma” or “social trap” by social psychologists. The phenomenon is very common in individualistic cultures (the West), but does the same phenomenon exist in collectivistic cultures which value cooperation and group goals more than individual benefits? The present authors employed a “replenishable ocean resource paradigm” that they developed on a series of studies in Taiwan and found that selfish behaviors were indeed very pervasive in the East. Several significant factors that affected the degree of cooperation and/or competition were also identified: sanction system, personal motivation, interpersonal relation, and the composition of decision making groups. In brief, it was found that the lower the severity of punishment or the less probability of being caught, the more selfish the subjects’ behaviors became. Subjects with the motives to maximize “individual gain” and “relative gain” competed more and did not differ from each other, while “joint gain” subjects competed the least. In addition, decisions made by group of three or five people were more selfish than the decisions made by the individual. The present authors and their associates also compared the behaviors of Taiwan and American students in the social dilemma situation directly. It was found that subjects from two cultures did differ on the cooperative behaviors. Taiwan subjects were more competitive than American subjects in general. Both “probability of inspection” and “degree of punishment” had significant effect on the Taiwanese’s behaviors, but only “inspection probability known or not” affected American subjects. In respects to Collectivism/Individualism Scale, Taiwan subjects did not score higher than American subjects on total collective measure, but Taiwan subjects scored higher than American subjects on collectivism toward spouses, parents, and relatives, and scored less than American subjects on collectivism toward colleagues/classmates and friends. Therefore, Taiwan subjects interacting with colleagues/classmates or friends were more selfish than American subjects. General discussion on the meaning, application and cross-cultural implication of this series of studies concludes this paper.

Keywords: *Social dilemma, Replenishable ocean resource paradigm, Cross-cultural studies, Decision making, Cooperation/competition*

To pursue immediate individual gain, people do something harmful to the group they belong and to themselves, though the harm is not immediate. Social psychologists call this phenomenon social dilemma or social trap. One remarkable example is the dilemma described in Garret Hardin’s (1968) [1] “Tragedy of Commons”: At one village in New England, a commonland was open for grazing. There was a plenty of grass for the villagers to keep some herds and support their family. However, villagers found that the cost of keeping herds was not high and there were still excess profits; consequently, every family tried to keep more and more herds. The grass was exhausted by the overgrazing and ceased to grow. The villagers could not keep their herds on the commonland any longer. A lot of problems in modern society, including those of exhausted resources, pollutions, traffic jams, the extinction of wild animals, and so on, are all good examples of social dilemmas. To make a summary of the scholars’ viewpoint, social dilemma is a multiparty decision making situation with the following three features: (1) Despite others’ decisions, an individual secures most profits when

he or she behaves selfishly. (2) Selfish behavior always does more harm to others than cooperative behavior. (3) When most of the group members behave selfishly, no one gains any profits from such selfish behavior [2-5].

In social dilemma, people are faced with a pull between two motives. That is, on the one hand, people want to cooperate, with a motive to achieving the optimal profits for the group and long-term returns for themselves. On the other hand, people want to compete, with a motive to having immediate, optimal profits for themselves. Therefore in social dilemma an individual’s choice of cooperative or selfish behaviors depends on whether that choice seems to yield most profits to him or her [7, 44]. Whenever there is conflict between the motivations of cooperation and competition, the latter always gains an upper hand. The following are the reasons: (1) For any given individual, uncooperative or selfish behavior is the most advantageous and rational response. Despite other people’s behavior, selfish or not, selfishness is the best policy for the individual. If others behave unselfishly, then an individual’s selfish behavior will secure more profits for him or her

without doing too much harm for the group. If others behave selfishly, then an individual will be prompted to follow suite; otherwise, he or she will gain no profits. (2) Competition results in gains and losses—but gains are ascribed to individuals while losses are shared by the group members. Such “gain-to-self and loss-spread-out” principle reinforces competitive motivation and lessens cooperative one. (3) In the group made up of N members, each member has only $1/N$ influence over the group. Therefore, whether the member chooses to behave cooperatively or selfishly, his or her decision does not have much bearing on the group’s overall performance. It is only when most of the members behave selfishly, their behaviors add up to overwhelming harm to the group. Such an incongruity occurring between individual behavior and group outcome results in blindness to the disadvantages of individual competitive behavior and prevents the solutions to social dilemma [8-9, 11-12].

The following are some purposes to be achieved in social dilemma studies: to understand the factors affecting people’s behavior, to increase group members’ cooperation, to reduce selfish competition, and to achieve the maximized profits for the group and individual. For these purposes, the scholars developed various games stimulating social dilemma, including prisoner’s dilemma game (initialized as PDG), N -person prisoner’s dilemma game (initialized as NPD [8, 13-16], give-some game [17], take-some game [2], and many replenishable resource paradigms [3, 5, 12, 18-19]. The games were designed to find out the variables affecting people’s cooperative and competitive behaviors and to see how the laboratory variables could be analogized to real-world situations to help solve various social dilemmas.

Most studies on social dilemma are conducted in Western countries, while there is a scanty research on this issue in Eastern countries. Culture is one of the important factors that contribute to the shaping of personal belief and behavior. People are affected by their own culture and tend to see things through “the glasses of culture” [7]. People’s life experience is always under the sway of their culture, and their perspective of life, self-concept, cognitive thinking pattern, and behavior are also deeply affected by their culture [20-22]. Individualist culture emphasizes personal achievements and self-realization in its social, economical, and legal structures, whereas collectivist culture stresses the inter-dependence based on social justice. Therefore, individualism tends to lay more emphasis on the individual, the equality, and the self than on the group [23]; on the contrary, collectivism tends to put more emphasis on the group and the interpersonal relation than on the self [24]. In contrast to the self-focused orientation of individualism, collectivism is more group-focused.

Collectivists are more willing to sacrifice personal gain for the sake of group gain when there is conflict between the two [24-28, 30]. Among the results of cross-cultural studies on the individualist/collectivist orientation, it is found that Western culture is more individualist-oriented (USA is a typical example), while Asian culture is more collectivist-oriented [25-27, 29]. Then is it possible to find similar selfish behaviors in Eastern collectivist culture, as is often the case in Western individualist culture? Or in the culture where group gain is stressed, are more cooperative behaviors likely to occur?

The researches reported in the following session are summary results of studies conducted in the past several years, and are divided into two parts. The first part is a series of indigenous studies investigating how sanction system, personal motivation, interpersonal relation, and the composition of decision-making groups respectively influences an individual’s behavior in social dilemma. The second part is a comparison of the Taiwanese students’ and American students’ cooperative behavior patterns in social dilemma.

1. SERIES OF INDIGENOUS STUDIES

To begin with, in order to understand how sanction system and communication feedback influence subjects’ decision-making in solving social dilemma, 420 university students, including 125 males and 295 females, were invited to take part in a research program, named “replenishable ocean resource paradigm.” In this activity, the researcher arranged five subjects for each session in which each subject representing a country’s fishery policy-maker and facing common ocean resources. In each year every country could catch a certain number of fish from the ocean. The number of the fish will replenish before the next fishing season; however, because of the equilibrium mechanism of ecology system, the number of the fish in the ocean has a maximum. For example, if there were 45,000,000 tons of fish in the ocean at first, and the number of fish every country could catch was supposed to fall between 0 and 9,000,000 tons, then the number of the fish at the end of the fishing season—the difference between 45,000,000 tons and the total gains of the five countries—would double itself yet it would never go beyond 45,000,000 tons.

This activity bore much similarity to the decision-making process involved in international interest clashing situations. The participant in this activity had to choose among maximizing individual gain (the gain of own country), maximizing relative gain (own gain more than others’ gain) and joint gain (the total gain of the five countries). To its own advantage, each country would make the most

use of the resources; however, to avoid the exhaustion of the resources, each country should follow the agreement made by the five countries that the annual fishing number of each country be within 4,500,000 tons. There were four independent variables in this research: (1) whether there was resource feedback or not (2) whether there was communication between group members or not (3) the probability of selfish behavior being caught was high or low (4) the gravity of punishment given to selfish behavior was high or low. Therefore this research was a 4 factorial design. The main dependent variables were as follows: (1) the number of years when ocean resources remained available, or the number of times the activity could be carried on (2) the total number of fish being caught in this activity (3) the number of fish being caught in the first year (4) the probability of violating the agreement. And it was found that (1) resource feedback and communication were the two most influential factors in this design, and they were interrelated to a remarkable extent. The subject's behavior was the least selfish when there were resource feedback and communication; on the contrary, the subject was most likely to show selfish behavior when there were neither resource feedback nor communication. (2) the sanction system greatly controlled the subject's behavior when there was neither resource feedback nor communication. The higher was the probability of being inspected, or the more grave was the punishment given to selfish behavior, the less selfish was the subject's behavior.

In addition, to understand how personal motivation influenced the subject's response in social dilemma, the researcher gave each subject a questionnaire asking "what goals would you like to achieve in this activity?" If the subject's answer was "to acquire benefits as many as possible for my own country," then the subject was classified into "individual gain" group. If the subject's answer was "to achieve a maximum of benefits for the five countries," then the subject was classified into "joint gain" group. If the answer was "to achieve more benefits for own country," then the subject was classified into "relative gain" group. It was found that the number of years when resources remained available was smaller in "individual gain" group than in "joint gain" group, and the "individual gain" group caught a larger number of fish in the first year than the "joint gain" group. And the "relative gain" group caught a larger number of fish in the first year than the "joint gain" group. As regards the probability of violating the agreement, the "relative gain" group was ranked as the top of the three groups, the "individual gain" group as the second, and the "joint gain" group as the third. And the difference between any groups of the three had reached to a statistically significant level.

Besides inquiring into personal motivation, our research

team also used Machiavellian Scale or Greed Motivation vs. Fear Motivation Scale to analyze how personal belief or motivation influenced a person's cooperative or competitive behavior. It was found that the subject's personal belief or motivation really influenced his or her behavior in social dilemma. "Machiavellian propensity" referred to the tendency to employ every trick to maneuver or influence others to fulfill one's own purpose. Our research used Yeh's (1983) modified Machiavellian Scale and found that the subject in higher "Machiavellian propensity" group caught more fish than that in lower "Machiavellian propensity" group in the first year. And the subject in higher "Machiavellian propensity" group was more likely to violate the agreement than that in lower "Machiavellian propensity" group. However, there was little difference between the two groups' total fishing quantity.

On the part of greed and fear motivations, the researcher would like to study what lay behind uncooperative behaviors in social dilemma [32]—it was greed motivation that drove people to take more resources than others before those resources were drained or it was fear motivation that drove people to take more resources because they feared that other people would take more from common resources. By designing a short scenario simulated on real-life traffic jams, our research team used self-edited Greed and Fear Motivation Scale to measure the subject's motivations in social dilemma. It was found that greed and fear motivations greatly influenced the subject's cooperative behavior. The higher was the subject's greed or fear motivation, the less was the subject's likelihood to cooperate. On the contrary, the lower was the subject's greed or fear motivation, the more was the subject's likelihood to cooperate.

Furthermore, to investigate whether the interpersonal relation within group members influences the behavior in social dilemma, the researcher designed a story about common goods (a campaign for a record chain-store) that modeled it on real-life situations. Employing various descriptions, the researcher was able to observe the group members' donation behaviors, given their relations were siblings or strangers with no blood ties. It was found that if the subjects were sisters, they showed more willingness to donate than if they were strangers to each other, which indicated that the interpersonal relation really influenced people's cooperative behavior in social dilemma.

The final part of the series of studies tried to compare the strategies used by individuals v.s. groups, which faced social dilemma, to decide their cooperative or competitive behavior. And our research also investigated how a group's composition and how inspection or sanction system influenced a group's decision-making. As regards the composition of a group, we designed two studies dealing with the impacts on cooperative behavior caused by the

following variables: the number of people involved in a decision-making group, group cohesion, and gender composition of a group.

Both studies employed replenishable ocean resource paradigm and were carried out in a laboratory. In Study 1, the subject was informed that the common ocean resources were shared by five countries, and in addition to the design of inspection and sanction system used in our previous studies, the number of fishery policy-makers was designed as 1, 3, and 5 (of the same gender) respectively. There were 40 groups, and the number of male groups and female groups was equal. And the total number of the subjects was 360. This study had 3 independent variables. It was a 3 (the number of policy-makers: 1, 3, and 5) $\times 2$ (the probability of inspection: high vs. low) $\times 2$ (the gravity of punishment: high vs. low) between-subject design. In Study 2, we analyzed how group cohesion and gender composition of a group influenced a group's decision-making in social dilemma. The degree of group cohesion was manipulated by the various descriptions (in the instruction) of the interpersonal relation between group members. The size of decision-making groups was constantly 5 people. And the gender composition of a group was manipulated by the design. Therefore Study 2 was a 2 (group cohesion: high vs. low) $\times 6$ (the gender composition of a group: five males, four males and one female, three males and two females, two males and three females, one male and four females, and five females respectively) between-subject design. Each cell had 5 groups, and there were totally 60 groups. In each group we had 5 people, and the total number of subjects was 300, in which the number of males and females was both 150.

In Study 1, it was found that the group decision-making (a merger of 3-people group and 5-people group) outnumbered the individual decision-making (1-people subject) in the total number of fish caught in the first year and the times of agreement violation. As regards the comparison between 1-people group, 3-people group, and 5-people group, 3-people and 5-people groups outnumbered 1-people subject in the above two items, whereas there was little difference between 3-people and 5-people groups in their performance. Therefore we concluded that when faced with social dilemma, the group tended to be more competitive than the individual, yet 5-people group was not necessarily more competitive than 3-people group.

In Study 2 it was found that group cohesion factor showed its main effect on the three indicators of competitive behavior: the total quantity of fish being caught, the times of agreement violation, and the quantity of fish being caught that exceeded the maximum allowance. In other words, the group with low cohesion caught a greater number of fish than that with high cohesion. And there

were interaction effects between group cohesion and group gender composition on the above three indicators. A further analysis led to the following findings: if most of the group members were females, then a group with low cohesion outnumbered that with high cohesion in the total quantity of fish being caught and the amount of fish exceeding the maximum allowance; however, if most of the group members were males, the degree of cohesion yielded little difference in the two indicators. As for the times of agreement violation, if most of the group members were females, the degree of cohesion yielded little difference; however, if most of the group members were males, a group with high cohesion outnumbered that with low cohesion.

2. CROSS-CULTURAL STUDIES—A COMPARATIVE STUDY ON TAIWANESE AND AMERICAN UNIVERSITY STUDENTS

In addition to a series of indigenous studies on social dilemma, the present researcher and their associates tried to compare how collective-oriented Taiwanese university students and how individualistic-oriented American university students behaved respectively when they were faced with social dilemma [33].

This experiment also employed replenishable ocean resource paradigm. The manipulated items in this experiment included whether informing the subjects of the probability of inspection or not, as well as the probability of inspection and the gravity of punishment. Therefore this study was a 2 (the probability of inspection: known or unknown) $\times 2$ (the probability of inspection: high or low) $\times 2$ (the gravity of punishment: high or low) three factorial design. And to reduce the interdependency between dependent variables, this experiment was a within-subject design—namely, in each session all countries facing common ocean resources belonged to a unique experimental condition, which made the number of the countries facing common resources increase to 8. The total quantity of common resources and the maximum of agreed fishing quantity were rearranged accordingly. Moreover, this experiment used Hui's INDCOL SCALE [26] to measure the subject's individualist/collective orientation toward his or her spouses, parents, relatives, neighbors, friends, and colleagues (classmates).

It was found that when facing social dilemma, the Taiwanese and American university students indeed responded differently to the sanction system. First, on the part of cooperative behavior, it was found that the Taiwanese students showed less willingness to cooperate than the American students. And when faced with punishment, the Taiwanese and American university students also differed

in their responses: the Taiwanese students reduced their selfish behavior on the condition that there was a high probability of inspection or high gravity of punishment; the gravity of punishment discouraged the American students' uncooperative behavior only when the probability of inspection was high. Besides, the inspection information—namely, to give or to withhold the probability of inspection—had the main effect on the American students' behavior; however, for the Taiwanese students this factor's effect had to be determined by the gravity of punishment.

On the part of individualist/collective orientation, it was found that the Taiwanese students did not have higher total scores in their collective orientation scales than the American students. However, whereas the Taiwan students had higher regards for their spouses, parents, and relatives, they (the Taiwanese students) had lower regards for their friends, colleagues or classmates. Therefore, provided that the Taiwanese students faced their classmates or strangers instead of their spouses, parents or relatives in the social dilemma situation, they (the Taiwanese students) showed more uncooperative behaviors than the American students.

3. GENERAL DISCUSSION

From the above series of experiments on Taiwanese subjects, it was found that sanction system, personal motivation, interpersonal relation, and decision group's characteristics were all important factors in determining individual's cooperation or competition in social dilemma. The results can be summarized as follows: (1) Sanction system: When the probability of selfish behavior getting inspected was lower or the gravity of selfish behavior's punishment was lesser, the subject would show more selfish behaviors in facing social dilemma. (2) Personal motivation: The subjects who were more oriented toward relative gain or individual gain (than toward joint gain) tended to have more selfish behaviors in facing social dilemma. And the subjects with higher Machiavellian propensity or higher greed or fear motivation tended to be less cooperative than those with lower Machiavellian propensity or lower greed or fear motivation. (3) Interpersonal relation: The closer the relation between group members was, the more likely the subjects are to show cooperative behaviors. (4) Decision group composition: The decisions made by the group of 3 or 5 people were more competitive than those made by an individual. The group with low cohesion tended to be more competitive than that with high cohesion. When groups were formed mostly by males vs. females, their competitive behavior showed essential difference. Most importantly, it was

found in the cross-cultural researches that the Taiwanese subjects did not exhibit more cooperative behaviors than the American ones did. And the Taiwanese subjects did not receive higher scores in the measurement of collectivism than their American counterparts. When faced with the sanction system, the subjects from Taiwan and America also responded differently: The Taiwanese subjects were very sensitive to high inspection or grave punishment; the American subjects were sensitive to whether the probability of inspection was told or not, and grave punishment was effective in reducing their competitive behaviors only when the probability of inspection was very high.

With regard to the sanction system, the researchers in Western countries or in Japan tended to adopt the methods of having cooperative behaviors rewarded and selfish ones punished, and they found that in most cases the methods really enhanced cooperation. For example, Yamagishi (1992)[34] found that the two methods were equally effective in enhancing the subject's cooperative behaviors. Tenbrunsel and Messick(1999) [35] found that the sanction system would help the people in social dilemma commit themselves to more cooperative behaviors. And Eek, Loukopoulos, Fujii, and Gaerling (2002) [36] found that the higher the price an individual had to pay for his or her own selfish behaviors, the less often he or she would show those behaviors. Our research manipulated not only the gravity of punishment but also the probability of inspection and whether or not the subjects were informed of the probability of inspection. By doing so, we not only testified to the effects of the grave punishment, but also broadened the connotations of punishment. It was found that the two variables (the latter ones in the above discussion) had different effects on the Taiwanese subjects and the American ones respectively. To the American subjects, whether the probability of inspection was told or not was the most important factor in determining their behaviors. However, to the Taiwanese subjects, the effectiveness of that factor still depended on the gravity of the punishment. The fact that Chinese students were less able to make correct judgment on the probability than American students could probably account for such a phenomenon [31].

When the sanction system changes in social dilemma, the subjects in the activities will reframe their cooperative or competitive behaviors accordingly. In addition to the method of having selfish behaviors punished, reducing the risk of cooperative behaviors (such as the exhaustion of resources caused by other people's selfish behaviors) and rewarding cooperative behaviors can also increase an individual's cooperation [34, 37]. Besides, in social dilemma, an individual can hide in the crowd, which produces the following two situations. On the one hand,

the effect of deindividuation makes his or her behavior less distinguishable to others; on the other hand, individual efforts have low connections with group achievements. These two situations help cover individuals' selfish behaviors and reduce their willingness to make efforts or their motivation to cooperate [37-38]. Therefore, by reducing the members' sense of diffusion of responsibility, and enhancing the connection between individual efforts and group achievements, an individual's selfish behaviors may be prevented.

On the part of personal motivation, considering various social value orientations, not everyone autonomously shows cooperative behavior in social dilemma. The term social value orientation means the specific principle an individual uses in allocating goods or resources for himself (or herself) or others [39-40]. People with cooperative orientation devote themselves to achieving the most profits for a group; people with individualistic orientation devote themselves to achieving their own profits and care little about others' gains; still people with competitive orientation devote themselves to winning over others and care little about their own personal gains. In the researches conducted by the Western scholars, it was found that given the traffic dilemma caused by the limitation of resources, the subjects with social orientation were more willing to use mass transportation (instead of insisting on the convenience of driving a car) than those with individualistic orientation [41]. De Dreu and McCusker (1997) [55] and Joireman (2001) [42] also found that the crux of social dilemma was more easily solved when people face cooperative-oriented opponents than when they face individualistic or competitive-oriented opponents. And the results of our research agreed with the proposition that people with different social value orientations tended to behave differently in social dilemma. The subjects oriented toward relative gain and individual gain had more selfish behaviors than those oriented toward joint gain. An individual's social value orientation is internalized through his or her previous education. Instead of instructing children to be competitive in social interactions, the education based on a cooperative value system teaches children how to think and behave in accord with the group [43]. Therefore the value system shaped by social-cultural formations really contributes greatly to the behavior pattern when an individual is in social dilemma.

Apart from social value orientation, Machiavellian propensity, greed and fear motivations were also the focus of our research. Among the Western scholars, envy [44], trust [39], and altruism were also their concerns in the researches on selfish behaviors in social dilemma. And these factors leave much room for discussion when a comparison of the eastern and Western cultures is held in

the future.

On the part of interpersonal relation, public goods situation was employed in our research to manipulate the subject's relation with other members in social dilemma. It was found when informed that the members in the situation were siblings (instead of strangers), the subject was more willing to show cooperation. This result was consistent with the results in the previous oriental researches: Chinese people did not treat everyone equally, they developed different interpersonal exchanging laws according to the degree of closeness [25, 45-49]. This result also agreed with the Western scholars' researches on group identity. Brewer and Kramer (1986) [50] found that when the subject's group identity was made salient, he or she would show more self-restraint and less selfish behaviors in dealing with the scarce resources. Northcraft, Polzer, Neale, and Kramer (1995) [51] and Van Vugt (2002) [5] also found that in social dilemma, if people considered other resource users as members of an in-group, they were more willing to show cooperative behaviors. In other words, the more the group identity grew, the more the members would value joint gain and show cooperative behaviors. In our research the interpersonal relation of group members was manipulated directly. The members in social dilemma were either siblings (the in-group) or strangers (the out-group), thus they had different level of group identity, and naturally, the different degree of cooperation.

As for the characteristics of the decision-making group, to begin with, it was found in our research that when facing social dilemma, an individual and a group differed in the way of decision-making. The decision made by a group would be more competition-oriented than that made by an individual. In our research, it was found that the groups of 3 and 5 people outnumbered the individual in the quantity of fish caught at the first year and in the times of violating the agreement. In other words, the group tended to be more competitive than the individual. These results agree with those in Liebrand's (1984) [10] research on the impact of personal motivation on cooperative behavior in social dilemma, a research based on N-person game. The result in Liebrand's research was that the group of 20 people was not more competitive than the group of 7 people. However, the result of our research does not agree with the result in Sejits and Latham's (2000) [11] research on the impact of personal and joint gain motivation on cooperative behavior in social dilemma. Their result was that the group of 7 people was more competitive than the group of 3 people. The possible explanations are as follows: on the one hand, the relation between the number of group members and cooperative behavior may vary with every culture. On the other hand, the relation between the number of group members and cooperative

behavior may be curvilinear rather than linear. Which of the above two is correct? Or what forms that curvilinear relation? These questions demand further research. As for the difference between group decision and an individual's decision, there is no comparative basis since no "individual" decision-subject was included in the previous two researches. However, in the light of group polarization phenomenon, competition is a dominant response, so it is reasonable that people tend to be more competitive in the group.

As for the influence group cohesion and group gender composition have on the decision-making in social dilemma, the Western scholars have not done experiments on these two variables directly yet. However, there were some interesting results in our research: (1) there was obvious interaction effect between group cohesion and group gender composition; the influence the degree of cohesion had varied with the group's gender composition. (2) In spite of the fact that there was no gender difference on the actual group's decision-making, the members still considered the male as the more influential figure. In this aspect, the results of some Western researches on the relative influence of different genders were consistent with our present finding. For example, Ridgeway (1982) [52] found that the female confederates were considered to have little influence in a group where all other four members were males, whereas the male confederates were considered to have great influence in the group that is constituted mostly by the females. Examining many researches on the influence of gender over the decision-making, Carli (2001) [53] found that with only few exceptions, most researchers acknowledged the gender difference and that the male had a greater influence than the female. This is mainly due to the fact that the female's intention (of influencing) is often ignored and the male's contribution is over-emphasized. And she also found that the following factors would moderate gender differences in social influence: the gender composition of individuals in an interaction; the influence agents' competence, dominance and communality; and the gender typing of the task. Therefore, it is suggested that future researches should focus on the effect of communication style in line with (or not in line with) gender expectations, and on how the gender of the communication party and the communicator's behaviors may influence the decision-making in social dilemma.

Lastly, on the part of the cross-cultural research, it was found that the Taiwanese subjects were no more cooperative than the American subjects. And the subjects from the two countries behaved differently to the sanction system. The result does not agree with that in Parks and Vu's (1994) [6] research on public goods and resource dilemma.

The result in their research was that the Vietnamese subjects were more cooperative than the American ones. However, the result in our research agrees with the result in Yamagishi's (1986a, b, 1988) [32, 54, 56] research where they found that with no sanction system, the American subjects were more cooperative than the Japanese ones in dealing with social dilemma. The above results indicate the long-held belief that people brought up in collective culture tend to be more cooperative is not absolutely correct. People usually also take the interpersonal relation into consideration when they decide on their cooperation. Take the Chinese for example. Although the Chinese were generally considered to be collectivism-oriented [29], yet they did not treat other people equally [25, 57]. They develop different interpersonal exchanging law according to the degree of closeness with other people. As the Chinese saying goes, "I would like to share my cars and clothes with my friends," so the Chinese will show more cooperative behaviors in the group, provided that the members have close relation with each other. On the contrary, the Chinese will be more self-interested and show less cooperative behaviors in the group, provided that the members are strangers with each other. On the basis of the results in the individualism/collectivism scale, it was found in our research that the Taiwanese subjects did not have higher total scores in their collective orientation scales than the American subjects. However, whereas the Taiwan subjects have higher scores in the collectivism scale as regards their relation with their spouses, parents, and relatives than the American subjects, they (the Taiwanese subjects) have lower scores in the collectivism scale as regards their relation with their friends, colleagues or classmates. Therefore, it is more accurate to use "differential order" [58] or relation orientation [46, 48-49, 59] to account for the working of the Chinese's interpersonal relation in determining cooperative behaviors in social dilemma than to use that simplified explanation—that people with collective orientation are more cooperative in social dilemma.

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