

THE GENERALIZED JIGSAW CLASSROOM PROGRAM: USE OF AN  
INFORMATION-SHARING TASK TO REDUCE INTERGROUP CONFLICT AND TO  
FOSTER WILLINGNESS FOR FUTURE COOPERATION

BY

ASAKO BROOK STONE

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the thesis of Asako Brook Stone find it satisfactory and recommended that it be accepted.

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Chair

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Abstract

by Asako Brook Stone, M.S.

Washington State University

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Chair: Craig D. Parks

Intergroup conflict is a socio-political issue with great opportunity for improvement. The jigsaw classroom program is known for its effectiveness at intergroup bias reduction in school settings. Utilizing aspects of this program, the present study examined the applicability of the jigsaw classroom program to a more general population. A total of 186 introductory psychology students at Washington State University completed questionnaires and an information-sharing task. The results suggest that the effectiveness of the jigsaw classroom program is applicable to outside of classroom settings. Further studies are necessary to examine effects of information-sharing styles and group sizes on the effectiveness of the generalized jigsaw classroom program.

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## INTRODUCTION

Intergroup conflict is inevitable when groups with different priorities interact with each other (Bar-Tal, 2000; Forsyth, 1999). When there is a disagreement about what is just and fair, further interaction leads to escalation of intergroup conflict. As such, evoking positive feelings about outgroups, and cooperative behavior between those groups, becomes a challenge. As time passes, the conflict becomes more difficult to resolve. People become more active in deliberately seeking dissimilarities among different groups. This phenomenon is called the accentuation effect (Forsyth, 1999), and it motivates further development of intergroup conflict. When such dissimilarities are associated with expectations for others' negative characteristics, they are called self-fulfilling prophecies (Brown, 2000). Such differentiation makes ingroup and outgroup members become distant from each other, and thus building trust among those groups becomes more difficult. Because people tend to hold more extreme viewpoints in order to differentiate their group from others, reduction of intergroup tensions become more and more difficult.

Intergroup interactions are often described as a cycle: intergroup interactions lead to intergroup conflict; intergroup conflict leads to escalation of conflict and conflict reduction becomes necessary; conflict reduction leads to positive intergroup interactions (Fisher & Ury, 1981). Breaking this cycle is necessary to achieve the ultimate goal of preventing the re-occurrence of conflict (Fisher & Ury, 1981; Forsyth, 1999). Although it is difficult, it is possible to break the conflict cycle by implementing interventions that affect multiple sources of conflict. With effective interventions, prevention of escalation

and future conflicts is very possible. Thus, this experimental research will discuss issues on intergroup conflict and suggest a possible intervention.

## **Types of Conflict**

Levels of hostility toward other groups differ, but conflicts among groups can be observed in many settings. There are two major types of conflict situations. The first one is interest-based conflict, and it can be observed in environmental issues, interpersonal relations, and disputes. These conflicts often arise from disagreement about values, ideas, and interests (Fisher & Ury, 1981; Weber, 1998). The second is ethnic conflict, and the roots of this type of conflict are more complex than interest-based conflicts (Forsyth, 1999). In addition to ethnicity itself, important aspects of the identity, such as cultures and beliefs, are in conflict. Examples of each follow.

### ***Interest-Based Conflict***

There has been a conflict among many different groups with regards to the current forest management in the United States. For example, the National Forest Service was created under the Department of Agriculture to manage our national forests. Although the original objective of the agency was to manage timber extraction, its mission has grown to include protection of wildlife and provision of public access to parks and trails. The extremely complex mission of managing forests for multiple competing uses has required the Forest Service to develop complex management plans for each of its forests. The management plans must pass NEPA requirements discussed earlier including a period of public comment and debate (AP, 2003; McClure, 2003).

The many groups interested in management decisions often have very opposing viewpoints on what is the best way to manage a forest. Often, mismanagement in the past creates new management obstacles and mistrust among participants. As a result, it has become increasingly difficult to approve management plans. This example demonstrates ideas and values that are in conflict. While some people prioritize environment protections, others prioritize industrial development. Because people define problems differently, developing agreeable solutions is a challenge.

### ***Ethnic Conflict***

In intergroup relations with intractable conflict such as the Palestinian-Israeli situation, fear dominates the information-processing systems of people. Hostile relations have arisen because values important to their identities such as religion, ethnicity, and lands are in conflict (Kelman, 1999), and they have a long history of intractable conflict with violence. In such cases, the relation is perceived as zero-sum in nature, and attempts to resolve the conflict fail. People cope with fear either by defense or aggression (Bar-Tal, 2001), and justification of aggressive behavior may be a form of defense.

The Palestinian-Israeli conflict is a classic example of ethnic conflict, and it illustrates the difficulties of reducing tensions between conflicting groups, especially when their social identity is at the root of the conflict. Unlike interest-based conflict, reaching resolutions in ethnic conflict is a challenge because the social identity of the combatants is difficult to change and the past history of hostility can escalate the magnitude of conflict.

## **Categorizations**

Group membership, ranging from interest-based groups to ethnicity and nationality, plays an important role in decision-making processes. Even though it is human nature to categorize objects in one's environment to better understand the world, social categorizations contribute to conflict by enhancing dissimilarities among different groups (Brewer & Miller, 1996). In the process of categorizing, people tend to favorably distinguish ingroup members from outgroup members in order to maintain their self-esteem. Such tendencies, also known as intergroup bias, motivate hostile attitudes toward outgroup members. In order to understand the roots of intergroup conflict, understanding intergroup bias is essential.

### ***Intergroup Bias***

Intergroup bias refers to skewed attitudes toward different groups based on their group identity. It consists of two main biases: ingroup bias and outgroup bias. Ingroup bias refers to positive attitudes toward a social ingroup (Brewer, 1991, 1993, 1999; Brewer & Miller, 1996), and outgroup bias consists of negative attitudes toward a social outgroup (Brewer 1999; Forsyth, 1999). An example of the former is ingroup favoritism while prejudice is an example of the latter. Intergroup bias prevents positive relations among different groups and accentuates the differences among them. Because people perceive few similarities to outgroup members, even getting to know them is discouraged. Intergroup bias contributes to the development of intergroup conflict; thus, understanding formation of intergroup bias is necessary.

## ***Social Identity Theory***

One of the explanations for intergroup bias is social identity. Social identity theory was developed by Tajfel and Turner (1986), and argues that individuals have a fundamental desire to positively evaluate themselves to maintain or heighten their self-esteem. They fulfill their desire by belonging to positively evaluated groups. During the process, they discredit outgroup members (Abrams & Hogg, 1990). Social identity theory has been studied among social psychologists for decades and has contributed to understanding intergroup relations.

Social identity theory has three main components: Categorization, identification, and comparison. Social categorization refers to the process in which individuals undertake to understand their social environment. An example of social environment is other people, and individuals categorize other people into different groups in order to organize their social environment. Religions, races, and gender are some examples of social categorizations.

Identification has two levels. One level is personal identity, which is individuals' self-identification as independent individuals (Brewer, 1991; Tajfel & Turner, 1986), and the other is social identity, in which individuals identify themselves as members of particular groups (Brewer 1991, Tajfel & Turner, 1986). For example, one may identify as an engineering student, which is a personal identity, as well as a student at Washington State University, which is a social identity. One's social identity can thus be considered an extension of personal-identity. Distinctions between ingroup (us) and outgroup (them) become important at a social level because non-group members are necessary to identify group members.

The third component is social comparison. Individuals desire to compare their ingroup to similar outgroups and to positively distinguish ingroup members from outgroup members (Tajfel & Turner, 1986). Such a tendency is also known as ingroup favoritism, and individuals heighten their self-esteem by positively differentiating their groups from others (Brewer, 1999). When people perceive intergroup relations as 'us vs. them', their membership within an ingroup becomes more salient. Because of this, they become less open to others. Consequently, they only seek information that supports their opinion and become even more committed to their viewpoint. It becomes more and more difficult for them to change their viewpoint because they have accumulated so much evidence in support of their position. This phenomenon is called entrapment and it encourages people to choose a competitive alternative by salience to ingroup membership (Brewer & Miller, 1996; Forsyth, 1999). In addition, members of a particular ingroup selectively compare themselves to a particular outgroup that is relevant to their group identity and is inferior to themselves in order to maintain high self-esteem by their affiliation to a particular group. For example, it has been shown that an individual's estimation of his or her skills depends on whether or not a favorite sports team has a winning record (Hirt, Zillmann, Erickson, & Kennedy, 1992). This shows that self-worth can be heightened by positive evaluations of an ingroup.

### ***Reduction of Intergroup Bias***

Because social identity contributes to intergroup conflict, learning how to minimize intergroup bias is important. Allport (1954) suggested that gaining mutual knowledge about outgroup members through contact would decrease outgroup bias, assuming that ignorance and the lack of knowledge foster outgroup bias. This notion is called the

contact hypothesis (Brewer & Miller, 1996; Stephan & Stephan, 1999). Effective application of the contact hypothesis requires the presence of conditions such as equal-status interaction, superordinate goals, and positive outcomes from cooperation (e.g. Allport, 1954; Brewer & Miller, 1996; Epstein, 1985; Forsyth, 1999; Pettigrew, 1979).

Equality of status in intergroup interaction is important in two main ways. First, equal status improves perception of outgroup members (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978; Weigel, Wiser, & Cook, 1975). Artificial equality among interacting groups is effective when interacting with different class (Stephan & Stephan, 1999). Equal status interaction also heightens perception of similarities among groups (McClendon, 1974). Because perceived similarities reduce intergroup bias, creating equality among interacting groups is important (Brewer, 1999; Leonardelli & Brewer, 2001).

Goals that can be achieved only by collaboration are called superordinate goals. Collaboration includes sharing knowledge, pooling of resources, and collaborative work. Superordinate goals create interdependence among groups, which encourages intergroup cooperation. By necessitating cooperative behavior to achieve their goals, collaboration among groups becomes more likely even when the dominant strategy of a group is to compete (to maximize their outcomes and to minimize others). The effectiveness of superordinate goals to reduce intergroup bias is evident in both lab settings (Gaertner, Mann, Dovidio, Murrell, & Pomare, 1990) and real-life settings (Sherif, Harvey, White, Hood, & Sherif, 1961).

A result from cooperation is also important because cooperation is most effective when people receive positive outcomes (Blanchard, Adelman, & Cook, 1975). This is because a positive outcome reinforces cooperative behavior. People generalize

success of cooperation to intergroup interaction, which induces outgroup attraction (Forsyth, 1999; Worchel & Austin, 1986). Past research has shown that a negative outcome resulted from cooperation results in scapegoating (Brewer & Miller, 1996; Worchel & Austin, 1986) and alienation of outgroups (Blanchard et al., 1975; Cook, 1978; Weigel et. al, 1975). Thus, a positive outcome is important both to foster cooperation and to prevent escalation of intergroup bias. In summary, applications of intergroup bias reduction programs must have all three of these conditions to maximize the effectiveness of the programs.

### **Cooperative Behavior**

Intergroup bias reduction and cooperative behavior are strongly related to each other. For example, ingroup bias fosters cooperation while outgroup bias hinders it (Brewer & Miller, 1996; Stephan & Stephan, 1999). Thus, individuals are more cooperative toward their ingroup than outgroup. It is also evident that cooperation reduces intergroup bias (Cook, 1978; Weigel et al., 1975). However, the bias reappears when a cooperative task is completed (Bornstein, 1989). Because intergroup bias prevents mutual cooperation, reduction of the bias immediately after a cooperative task does not necessarily induce sustained cooperation with outgroup members. Thus, it is important to examine the duration of effects in order to foster cooperative behavior in the future.

#### ***The Prisoner's Dilemma Game***

One arena in which cooperative behavior can be examined is the prisoner's dilemma game (PDG). The PDG is usually a two-person game, which represents

mixed-motive situations in which individual benefits and collective benefits are in conflict (Komorita & Parks, 1994). The payoffs of the PDG are such that it is always better for a player to choose defection regardless of the other player's choice. Table 1 shows an example. In this example, 'A' represents cooperation and 'B' represents defection. By choosing 'B', one can receive 7 points or 1 point depending upon the other player's choice. On the other hand, one can receive 4 points only if the other player also chooses 'A'. There is no reward for choosing 'A' if the other player chooses 'B'. Thus, it appears as though it is more rational to choose 'B' no matter what the other player chooses. However, choice 'A' becomes more tentative than a choice 'B' in a long term because the other player tends to reciprocate (Richards, 2001). Mutual choice of 'B' rewards both players 1 point, while mutual choice of 'A' rewards players 4 points. Thus, choice 'A' becomes a more rational decision.

### ***Fostering Cooperative Behavior***

Extensive research with the PDG has identified conditions in which two individuals mutually cooperate. For example, collectivity fosters intergroup cooperation (Parks & Sanna, 1999). Collective thoughts instead of individual thoughts lead people to mutually cooperate. Intergroup interaction is suggested as a way to create collective thoughts (e.g. Drolet & Morris, 2000; Kerr & Kaufman-Gilliland, 1997). People are more cooperative toward ingroup members (Dion, 1973), even in absence of interpersonal communication (Kramer & Brewer, 1984).

Even though processes to facilitate cooperative behavior between individuals have been established, little research has focused on enhancement of cooperative behavior between groups. Because past studies have shown that groups are more competitive

than individuals (Hoyle, Pinkley, & Insko, 1989; Insko, Schopler, Kennedy, Dahl, Graetz, & Drigotas, 1992), it is important to develop interventions that are effective at both individual and group levels. One of the few findings on group-level cooperation shows that intragroup cooperation increases as intergroup competition arises. In other words, members of a group tend to be more willing to sacrifice their personal interests for benefits for a group (e.g. Bornstein, 1990; Erev, Bornstein, and Galili, 1993). Although intragroup cooperation is as important as intergroup cooperation, applicability of this finding is low. Cooperative behavior should be fostered without creating possible hostilities such as competition. Thus, this research focused on fostering intergroup cooperation in a way to avoid motivating a possible competition.

Past studies on intergroup conflict has mostly focused on the immediate effects of cooperation. Cooperation results in intergroup bias reduction; however, the bias reappears when a cooperative task is over (Bornstein, 1989). The intergroup bias prevents mutual cooperation; thus, reducing the bias does not necessarily induce future cooperation with outgroup members. Consequently, intergroup conflict arises when those two groups interact despite the history of cooperation. In order for interventions to be effective at evoking future cooperation, sustainable intergroup bias reduction is necessary. Thus, this research focused on 'long-term effects' of a cooperative task as well as short-term effects. The information-sharing task in this study was modeled on the jigsaw classroom.

## **The Jigsaw Classroom**

The jigsaw classroom is an interdependent learning technique that fosters positive inter-ethnic relations (Aronson, 1990). The jigsaw classroom consists of the following phases. First, small learning groups of 5 or 6 students from different ethnic backgrounds are formed, and each student learns a portion of the topic subject. Then, each member of the learning group teaches that portion of the subject to the rest of the learning group (Aronson & Osherow, 1980). The jigsaw classroom is an effective application for reducing intergroup bias and integrating different ethnic groups in elementary school settings because there is evidence that experiences in earlier stages of our lives greatly changes our perceptions and behavior (Aronson, Blaney, Stephan, Sikes, & Snapp, 1978).

Success of the jigsaw classrooms in reducing intergroup bias is based on the way this intervention is structured. The jigsaw classroom contains essential prerequisites for bias reduction such as superordinate goals, interdependence, and equal-status interaction. Intergroup cooperation can be achieved by superordinate goals (i.e. goals that can only be reached by collaboration of every group). In the jigsaw classroom, the superordinate goal is to learn the material completely. Thus, every student cooperates and shares his or her unique information with others. That situation creates interdependence among students, and cooperative behavior becomes more beneficial and rational. Because each person in the learning group is the only resource to unique information about the subject, it is necessary to help each other in order to learn the lesson completely. Moreover, such unique information creates equal-status interaction because everyone is an expert on a subject that everyone else has to learn.

That the information-sharing component of the jigsaw classroom might act to reduce intergroup conflict is suggested by research on transactive memory. Transactive memory refers to a collective memory system in which each member of a group plays a 'storage role' for a portion of the information. Past experiments show that individuals encode and retrieve information more efficiently when information is effectively divided according to individuals' expertise (Hollingshead, 1998). The exchange of information between two individuals in this case can be perceived as a form of cooperation because complete information can be retrieved only when both individuals successfully encode information for which they are responsible. It has also been suggested that people tend to selectively encode information in order to maximize transactive memory (Hollingshead, 2000). For example, people tend to encode information about their expertise when their partners possess different expertise, while people encode information not related to their expertise when their partners possess similar expertise.

Even though the jigsaw classroom is a well-established technique to reduce intergroup bias, it has only been applied in classroom settings. Thus, it is critical to investigate applicability of the jigsaw classroom to more general intergroup relations. Duration of positive effects by an intervention must also be examined because past research suggests that perceptual and behavioral changes due to interventions are mostly temporary (Bornstein, 1989). In order to examine the effectiveness of information sharing on future cooperation and bias reduction, the following study was conducted.

## **Reactance Theory**

Past research on cooperative behavior did not provide a choice whether or not to cooperate with others, thus this study examined the effects of choice on the information-sharing task's efficacy. This is based on a theory of psychological reactance (Brehm, 1966), which suggests that people experience unpleasantness when their freedom of choice is threatened. This unpleasantness to a threat is called 'reactance' (Brehm, 1966; Brehm & Weintraub, 1977) and people in turn perform an opposite behavior in order to feel as though their freedom has not been threatened (Pennebaker & Sanders, 1976). It is possible that reactance to required cooperation triggers a negative attitude toward outgroup members and ineffective cooperation.

## **The Present Study**

The present study applied aspects of the jigsaw classroom to general intergroup relations. The homicide investigation paradigm by Stasser, Stewart, and Wittenbaum (1995) was used as an information-sharing task in this study. Participants' task was to determine which of three suspects most likely committed a crime. Important aspects of the jigsaw classroom such as superordinate goals, equal-status interaction, and positive outcome from cooperation are evident in the homicide investigation paradigm. The superordinate goal of the homicide investigation paradigm was to solve the homicide case and prosecute the right person. This would create interdependence among participants. Equal-status interaction was achieved by distribution of unshared information to each participant, which led everyone to become expert of unique knowledge. The information-sharing component created positive outcome from

cooperation. The task was set up in a way that participants could accurately complete the task only when they cooperated and shared information with other participants.

The following hypotheses were tested in order to investigate the effectiveness of the generalized jigsaw method:

Hypothesis 1: (intergroup bias) The generalized jigsaw classroom will be effective in a general intergroup interaction setting. It was predicted that the mean score of intergroup bias scales would be lower at post-test than at pretest. It was also predicted that the mean difference of money allocation to self and others would be smaller at post-test than at pretest.

Hypothesis 2: (willingness for future cooperation) The generalized jigsaw classroom would foster willingness to cooperate with outgroup members in the future. It was predicted that the responses to the willingness scale would show a significant increase from pretest to post-test.

Hypothesis 3: (Choice status) The generalized jigsaw classroom would be more effective in the Choice condition than in the Required condition. It was predicted that the magnitude of intergroup bias reduction would be more significant in the Choice than in the Required condition. Thus Choice status x Time interaction was predicted.

Hypothesis 4: (Group size) The generalized jigsaw classroom would be effective both at the Individual and the Group level. It was predicted that both conditions would show significant decrease in the intergroup bias scale and increase in the willingness for future cooperation scale. However, it was also predicted that discontinuity effects would

be evident at pretest but not at post-test. There should thus be a Time x Group size interaction.

Hypothesis 5: (accuracy) The accuracy of the task would be higher at Group than the Individual level. The accuracy would also be higher in the Choice than the Required condition.

## METHOD

### **Design**

The design of the study was a 2 (Group Size: Individual vs. Group) x 2 (Choice Status: Choice vs. Required) x 2 (Time: Pretest vs. Post-test) mixed group design. The independent variables were group size and choice status. Dependent variables were the intergroup bias scale, the willingness for future cooperation scale, and accuracy.

### **Participants**

A total of 189 introductory psychology students participated in the study for partial fulfillment of a course requirement. Four participants were removed due to their failure to complete the measures. Each participant was randomly assigned to one of 4 conditions (Required-Individual, Required-Group, Choice-Individual, or Choice-Group condition). In the Individual condition, there were 3 participants for each experiment. In the Group condition, there were 9 participants randomly assigned to one of three 3-person groups. Similarly, sharing information was by choice in the Choice condition, while it was required for a completion of the task in the Required condition.

### **Apparatus and Stimuli**

*Manipulation of group:* Color-coded tags, color-coded information folders, and spatially separated tables were used to manipulate ingroup and outgroup. When participants entered the experiment room, they were randomly assigned to one of three

groups. For a visible group identity, color-coded tags were handed to participants and they were seated according to their group colors.

*Information-sharing task (generalized jigsaw classroom):* The homicide investigation paradigm developed by Stasser, Stewart, and Wittenbaum (1995) was used as the information-sharing task. Participants were asked to determine which of three listed suspects most likely committed a crime. Participants learned about a murder case from a 27-page packet including interviews from an investigator, a note written by one of suspects, 2 maps of a crime scene, and a newspaper article on background information. There were 24 clues with regard to the case, of which 18 were about suspects (6 clues for each suspect) and 6 exonerated 2 of the suspects. Every group held unshared information that was crucial to a determination of the murderer.

*Intergroup bias scale:* It was used to measure intergroup bias at both pretest and post-test. Statements 'I like them', 'they are cooperative', 'they are trustworthy', and 'they are valuable' were rated on 1-7 scales, with 1= 'not at agree' and 7= 'very much agree' (Gaertner et al., 1989). When analyzed, those values were reversed. Thus, the scale became 1= 'very much agree' and 7= 'not at agree' to make the scale consistent with the magnitude of intergroup bias.

*Allocation of money:* In order to examine the intergroup bias in another way, participants were asked to allocate 100 dollars among three teams in the experimental session.

*Willingness for future cooperation scale:* The willingness scale was used to measure how willing participants were to cooperate with outgroup members in the future. A question 'to what extent are you willing to work with the Blue/ Red/ Yellow'

team was rated on a 1-7 scale, with 1= 'not at all' and 7= 'very much' before the information-sharing task. As a post-test, a question 'there is a possibility that you will be asked to repeat the task later. How much are you willing to keep your partners for the future decision-making?' was rated on the same 1-7 point scale after the task.

*Accuracy:* In order to examine differences in accuracy, participants were asked to report the suspect who most likely committed the murder by completing the following sentence: 'The name of a suspect who most likely committed a crime is \_\_\_\_\_.' They were also asked to write down the supporting evidence in order to eliminate the accurate answer by a chance. At least one of 6 clues about the murderer had to be presented in order for an accurate answer.

*Intergroup definition:* Intergroup definition (Gaertner, Mann, Murrell & Dovidio, 1989) was used to examine perceptions of participants with regard to intergroup interaction after the information-sharing task. Participants chose one of the following four choices that best matched how they perceived the intergroup interaction: a) separate individuals, b) a group, c) three different groups, and d) subgroups within one bigger group.

*Pleasantness of interaction:* Participants' perceptions about pleasantness of interactions with other participants were measured. The question, ' How pleasant do you think interactions with the other teams were?' was rated on a 1-7 scale, with 1= 'not at all' and 7= 'very much.'

## **Procedures**

The policies regarding participation and the general instructions for the experiment were given to participants first. After signing the consent forms, they drew colored tokens to determine to which group they would belong in the homicide game. Participants were assigned to designated tables according to their colors and then received tags that matched their team color. Participants then completed pretest.

After completion of pretest, an experimenter gave participants instructions for the task. In order to simulate long-term relations, participants were not told how many trials they were to participate. They were asked to determine which of three suspects most likely murdered the victim based on the information they gather. It was noted that not all information was shared with the other groups. They had 25 minutes to read a packet within a group and another 15 minutes to share the information with the other groups. In the Required condition, sharing information was required in order to complete the task. In addition, participants in the Required condition were asked to reach an agreement on who most likely committed the crime. In the Choice condition, participants were able to decide whether or not to share information with the other groups. They were required to make a collective response if they wished to work together.

After 25 minutes passed, participants moved to the table in the center to share their information with other participants in the experiment. Lastly, participants moved to the original table and filled out post-test. When they completed the test, they were thanked and received credit slips and the debriefing form.

## RESULTS

### Intergroup Bias

#### *Intergroup Bias Scale*

A 2 (Group size) x 2 (Choice status) x 2 (Time) repeated measure ANOVA was conducted to examine the effects of the information-sharing task on intergroup bias reduction. Means are shown in Table 2. There was a significant main effect of Time,  $F(1, 183) = 163.03, p < .001$ , such that the mean of the intergroup bias scale was significantly lower at post-test ( $M = 1.19$ ) than pretest ( $M = 2.47$ ). In other words, the information-sharing task was effective at reducing intergroup bias. This result confirmed the prediction in hypothesis 1. The main effect of Choice Status was also significant,  $F(1, 183) = 14.71, p < .001$ . Participants in the Required condition scored significantly lower ( $M = 1.61$ ) than those in the Choice condition ( $M = 2.08$ ). The Choice Status x Time interaction was insignificant,  $F(1, 183) = -1.62, p = .21$ . Thus, hypothesis 3 was not confirmed. The main effect of Group Size showed significance,  $F(1, 183) = 9.43, p < .01$ . The mean score was significantly lower in the Individual condition ( $M = 1.63$ ) than in the Group condition ( $M = 2.01$ ). The group size x time interaction was insignificant,  $F(1, 183) = -1.42, p = .24$ . Thus, hypothesis 4 was not confirmed.

### ***Allocation of Money***

The mean gap between allocation of money to self and other teams was first calculated and then a 2 (Group Size) x 2 (Choice Status) x 2 (Time) repeated measures ANOVA was conducted to examine intergroup bias in a different way. Means are shown in Table 3. There was a significant main effect of Time,  $F(1, 183) = 5.63, p < .05$ . The money was allocated more equally among the groups at post-test ( $M = 17.75$ ) than at pre-test ( $M = 23.76$ ). This is consistent with hypothesis 1. There was no significant main effect of Choice Status. The interaction between Choice Status and Time was not significant either,  $F(1, 183) = 2.32, p = .13$ . This was inconsistent with hypothesis 3. The main effect of Group Size was significant,  $F(1, 183) = 9.74, p < .01$ . Participants in the Individual condition allocated the money more equally ( $M = 14.47$ ) than those in the Group condition ( $M = 26.62$ ). The Group Size x Time interaction was significant,  $F(1, 183) = 3.34, p < .05$ . The post-hoc analysis showed that the significant difference in the equality of money allocation at pretest ( $t(183) = -3.53, p < .05$ ) disappeared at post-test ( $t(183) = -1.61, p = .11$ ). This confirmed hypothesis 4.

### **Willingness for Future Cooperation**

A 2 (Group Size) x 2 (Choice Status) x 2 (Time) repeated measure ANOVA was conducted to examine the effects of the information-sharing task on willingness for future cooperation. Means are shown in Table 4. As predicted in hypothesis 2, there was a significant main effect of Time,  $F(1, 183) = 25.10, p < .001$ . The mean score of the willingness scale was significantly higher at post-test ( $M = 5.90$ ) than at pretest ( $M = 5.43$ ). A significant main effect of Choice Status showed that participants in the

Required condition gave higher ratings ( $M= 5.96$ ) than those in the Choice condition ( $M= 5.38$ ),  $F(1, 183)= 16.68$ ,  $p<.001$ . The interaction between Choice Status and Time was not significant,  $F(1, 183)= .11$ ,  $p= .74$ . Thus, hypothesis 3 was not confirmed. The main effect of Group Size was significant,  $F(1, 183)= 10.02$ ,  $p<.01$ , such that participants in the Individual condition gave significantly higher rating ( $M=5.92$ ) than those in the Group condition ( $M= 5.39$ ). There was a significant 2-way interaction between Group Size and Time,  $F(1, 183)= 5.96$ ,  $<.05$ . The post-hoc analysis showed that there was a significant difference in the ratings between the Individual ( $M= 5.79$ ) and the Group condition ( $M= 5.10$ ) at pretest,  $t(183)= 3.50$ ,  $p<.05$ , but not at post-test,  $t(183)= 1.12$ ,  $p=.74$  (Individual  $M= 6.05$ , Group  $M= 5.68$ ). In other words, the difference in willingness for cooperation between the conditions disappears at post-test. This confirmed hypothesis 4.

### **Accuracy**

A 2 (Group Size) x 2 (Choice Status) logistic regression was conducted to examine the accuracy of the solution to the homicide mystery. Participants named one of three suspects as the murderer as a completion of task, and the accuracy was filtered in order to avoid a correct answer by a chance. The dependent variable of the task accuracy is Accurate = 1 and Not accurate = 0. Table 5 shows the summary. Wald statistics of the group size is 4.20 and choice status is 12.26. Both are significant at the .05 level. The significance of the overall model was evident from the model chi-square,  $X^2= 16.36$ ,  $p<.05$ . The model predicts the responses correctly 64.7% of the time, and the Nagelkerke  $R^2$  is .11. In short, group size and choice status are both significant

predictors of the task accuracy. The task was more accurately completed in the Group condition than Individual condition, and in the Choice condition than Required condition. This is consistent with hypothesis 5.

## **Secondary Analyses**

### ***Intergroup Definition***

Each response of the Intergroup definition was coded as 'a group = 1', 'subgroups within a group = 2', 'separate individuals = 3' and 'three different groups = 4.' A 2 (Group Size) x 2 (Choice Status) multi-nominal regression was conducted, but the effects of neither group size nor choice status on intergroup definition was significant. Because only 9 participants selected the option 3 and 11 participants selected the option 4, a binary logistic regression was conducted with 1= 'a group' and 2= 'subgroups within a group' as dependent variables. Thus, none of the results were significant. Descriptively, 57.2% of participants perceived them as a group, 32.1% as subgroups within a group, and the other 10.7% as either three different groups or individuals. It is evident from the results that a superordinate identity was perceived by most of participants.

### ***Pleasantness of Interaction***

A 2 (Group Size) x 2 (Choice Status) ANOVA was conducted to examine the effects of the information-sharing task on pleasantness of interaction. No group effect or choice status effect was evident. Across the conditions, participants rated the pleasantness of interaction scale higher than 5.5, suggesting that the information-sharing task was evidently pleasant.

### ***Correlation***

Two Pearson R correlation were conducted to test the correlation between intergroup bias and willingness for future cooperation. There was a significant correlation between those two scales both at pretest ( $r = -.44, p < .01$ ) and at post-test ( $r = -.71, p < .01$ ). Thus, decrease in intergroup bias is significantly correlated to increase in willingness for future cooperation.

## DISCUSSION

### Summary

This study was conducted to examine the generalized jigsaw classroom's effectiveness for intergroup bias reduction and fostering willingness for future cooperation. As predicted in hypothesis 1, the information-sharing task was effective as an intergroup bias reduction program for adults outside of academic settings. Past studies support this finding, as components of the information-sharing task like equal status (Aronson et al., 1978; Brewer, 1999; Leonardelli & Brewer, 2001; McClendon, 1974; Stephan & Stephan, 1999; Weigel et al., 1975), a superordinate goal (Gaertner et al., 1990; Sherif et al., 1961), cooperation (Cook, 1978; Weigel et al., 1975), and a positive outcome from cooperation (Blanchard et al., 1975; Forsyth, 1999; Worchel & Austin, 1986) are effective for reducing intergroup bias.

The information-sharing task was also effective at fostering willingness for future cooperation. As predicted in hypothesis 2, the score means for the willingness scale showed significant increases from pretest to post-test. This discovery is important because other cooperative tasks only have immediate effects on intergroup bias reduction. Past studies have shown that effects dissipate as time passes (Bornstein, 1989). Thus, those tasks fail to foster future cooperation. Even though repetition of the study is necessary to examine the reliability of this finding, the result supports the effectiveness of the information-sharing task for encouraging future cooperation.

Overall, there was no significant difference in the efficacy of the information-sharing task on reducing intergroup bias and fostering willingness for future cooperation

between the Choice and the Required conditions. This finding was contradictory to hypothesis 3. However, it was evident that people perceived outgroup members more negatively when cooperation was by choice than when cooperation was required. People with a choice were also less willing to cooperate with outgroup members across times. One possible explanation for this phenomenon is based on cognitive dissonance theory (Festinger, 1957). The theory argues that changes in individuals' attitudes occur when they experience unpleasant tensions between their beliefs and behavior (Aronson, 1989, 1992; Brehm & Cohen, 1962; Festinger, 1957; Festinger & Carlsmith, 1959; Kunda, 1999, Wickland & Brehm, 1976). Aronson (1960) suggested that dissonance is the strongest when one's self-concept is engaged. Three ways to resolve dissonance discussed by Festinger (1957) includes: reduction of importance of the belief, addition of compatible beliefs to overcome the dissonant believes, and change of the dissonant beliefs. The concept of cognitive dissonance has been applied to attitude and behavioral change (Fried & Aronson, 1995; Dickerson, Thibodeau, Aronson & Miller, 1992; Stone, Aronson, Crain, Winslow, & Fried, 1994) and showed more effectiveness than programs based on increased incentives such as reinforcement (DiClemente, 1990; Stone et al, 1994).

In this study, participants in the Required condition might have experienced discomfort when they were 'required' into sharing information with outgroup members. Because their attitudes toward outgroup members contradicted with their cooperative behavior, they might have sought an alternate explanation of their cooperative behavior toward outgroup members. In addition, it is possible that dissonance was accentuated due to participants' attitude toward outgroup members, which is often interrelated to

their self-concept. Because this study did not examine cognitive dissonance arisen from required cooperation, further investigations are necessary to support this explanation.

As predicted in hypothesis 4, the information-sharing task was effective both at the individual and group levels. The information-sharing task significantly reduced intergroup bias and fostered willingness for future cooperation in both interindividual and intergroup settings. As predicted, interindividual- intergroup discontinuity was evident at pretest. As discontinuity effect predicts (Hoyle et al, 1989; Insko et al., 1992), attitudes of groups were more negative than that of individuals in this study. This may explain why perceptions were significantly more negative in intergroup settings than interindividual setting before the information-sharing task. However, the discontinuity effect disappeared at post-test. A possible explanation why the information-task was able to successfully reduce intergroup bias at group level is the following. The superordinate goal set by the information-sharing task was effective to establish a superordinate identity upon completion of the task. As the intergroup definition scale showed, most participants perceived superordinate identity as either the primary or secondary identity during the information-sharing task.

The accuracy of the task was significantly higher in intergroup than interindividual settings. This is consistent with past research (Brown, 1988; Hollingshead, 1998). This finding was important because some other studies show that groups are less efficient than individuals (i.e. Latané, 1981; Steiner, 1986). In other words, the information-sharing task is effective for overcoming some of the drawbacks of group settings. The accuracy of the information-sharing task was also higher when people had a choice

between sharing and not sharing the information. Even though those findings confirmed hypothesis 5, it is quite surprising to discover that accuracy of the task was independent of the positivity of intergroup relations. Further research is necessary to investigate this phenomenon.

### **Limitations and Future Directions**

Even though the present study provided insights of the generalized jigsaw classroom's effectiveness in a non-classroom setting, there are several limitations. The first part of the following section will discuss such limitations. Then, several planned follow-up studies will be discussed in order to address listed limitations. That the ultimate purpose of this study is to establish an effective program to promote positive intergroup relations, future studies will be discussed.

#### ***Cognitive Dissonance Theory***

The present study showed the potential role of choice in the information-sharing task. In order to further understand the ways in which choice affects the effectiveness of the task, a future study will examine cognitive dissonance in three different settings. If negative attitude observed in Choice conditions could be explained with cognitive dissonance theory, people will behave similarly when they are rewarded as a result of cooperation. It is because rewards often provide alternative explanations for one's contradictory behavior (i.e. Aronson, 1969, 1992).

The proposed study will be a partial replication of this study and will be a 3 (Choice vs. Required vs. Rewarded) x2 (Individual vs. Group) x2 (Pretest vs. Post-test) mixed design. In addition to the measurements used in this study, dissonance of participants

will be measured. It is predicted that participants in the Required condition will experience dissonance before the information-sharing task and thus rate higher in the intergroup bias scale and the willingness scale than those in the Choice or the Rewarded condition.

### ***Positive Outcome from Cooperation***

In this study, the positive outcome of cooperation was created by information sharing. In order to maximize the positivity of the information-sharing task, accuracy information was not provided until the experiment was completed. Because a positive outcome from cooperation can also be induced from task accuracy of tasks in real world settings, it will be meaningful to examine the effects of the task accuracy on their perception toward outgroups and their willingness for future cooperation.

A partial replication of the study will be conducted in order to investigate the effects of the outcomes of the task accuracy on intergroup bias and the willingness of future cooperation. The study will be a 2 (Accurate vs. Inaccurate) x2 (Outcome vs. Control) x2 (Pretest vs. Post-test) mixed design. In Outcome conditions, participants will be provided with accuracy information about their completed task before post-test, while participants will receive accuracy information after completion of post-test in the Control condition. It is predicted that when participants accurately complete the task, the effectiveness of the information-sharing task will be higher in Outcome conditions, while the effectiveness of the task will be higher in Control conditions when their task is inaccurate.

### ***Actual Future Cooperation***

The effects of the information-sharing task on willingness for future cooperation was examined in this study, and it showed the information-sharing task is effective at fostering such an attitude. However, actual future cooperation was not measured due to the structure of the experiment. Because the link between attitude and behavior is unclear (i.e. Wicker, 1969) and the ultimate objective of the information-sharing task is to foster long-term intergroup cooperation, it is important to examine the effects of the information-sharing task on future cooperation.

Because it is problematic to draw the link between attitudes and behavior, one of follow-up studies will focus on the effects of the information-sharing task on future cooperation. The study will be a 2 (choice status) x 2 (Future vs. Control) x 2 (Pretest vs. Post-test) mixed design. It is predicted that people will more likely cooperate when the information-sharing task is more effective.

### ***Ethnic Conflict***

The intergroup settings in this study was created arbitrarily. Even though it was important discovery that the information-sharing task was effective at simultaneously reducing intergroup bias and fostering the willingness for future cooperation, applicability of the task to interethnic relations is still questionable. In the real world, pre-existing stereotypes provide specific expectations about outgroup. Because such stereotypes serve as resistance to process information that is inconsistent with expectations, changing people's attitudes toward outgroup members is a challenge (e.g. Allport, 1954; Brewer & Miller, 1996; Epstein, 1985; Forsyth, 1999; Pettigrew, 1979;

Stephan & Stephan, 1999). Thus, addressing such stereotypes is essential to achieve positive interethnic relations.

Because stereotyping is an automatic process and thus people are not aware of this process (i.e. Devine, 1989), awareness of stereotypes is absolutely necessary to remove any ambiguity about stereotypes people hold. For example, it can be achieved by listing images and expectations about outgroup members. This is the first step of removal of stereotypes, because the second step involves displays of anti-stereotypical behavior committed by outgroup members. If repeatedly presented images create stereotypes, then it should be possible to remove or replace stereotypes by presenting images that are inconsistent with pre-existing stereotypes.

The usefulness of the information-sharing task is based on its ability to reduce general intergroup bias in order to make people more willing to perceive complexity of outgroup members. It is possible, because people perceive outgroup members more similar to them as a result of reduced intergroup bias. Then, presentations of anti-stereotypical behavior by outgroup members should be more accessible to be processed, which ultimately eliminate pre-existing stereotypes. It should be effective at interindividual level, but institutional support is necessary for effective removal of stereotypes at intergroup or societal level.

## **Conclusion**

As the first of a series of studies directed at creating an effective program for improving intergroup relations, this experiment focused on addressing intergroup bias reduction and willingness for future cooperation. The significance of this study is based

on its ability to address those two factors simultaneously because past research has shown that intergroup bias reduction, resulting from cooperation, disappears at the conclusion of the cooperative task (i.e. Bornstein, 1989). Because a history of cooperation with outgroup members does not necessarily foster cooperation with them in the future, long-lasting effects are qualifying factors for an effective intergroup relation improvement program.

Intergroup conflict is inevitable and is ubiquitous. In order to form harmonious intergroup relations, a program to address multiple aspects of conflict is beneficial. Because it is possible to prevent the escalation of future conflict by reducing intergroup tension, this study examined the effectiveness of the information-sharing task developed by fusing aspects of the jigsaw classroom. More studies are essential, but contributions of this research should be acknowledged.

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		Person 1	
		A	B
2	A	4 / 4	7 / 0
	B	0 / 7	1 / 1

Table 1: A Matrix for the Prisoner's Dilemma Game

Means of Intergroup Bias Scale			
	Pre	Post	Mean
Group Size			
Individual	2.32	0.93	1.63
Group	2.60	1.42	2.01
Task			
Required	2.31	0.90	1.61
Choice	2.65	1.51	2.08
Mean	2.47	1.19	

Table 2: The Means of Intergroup Bias Scale

Mean of Money Allocation Gap			
	Pre	Post	Mean
Group Size			
Individual	15.17	13.76	14.47
Group	31.99	21.24	26.62
Task			
Required	24.26	14.56	19.41
Choice	23.62	21.43	22.53
Mean	23.76	17.75	20.75

Table 3: The Means of Money Allocation Gap

Means of Willingness Scale			
	Pre	Post	Mean
Group Size			
Individual	5.79	6.05	5.92
Group	5.10	5.68	5.39
Task			
Required	5.68	6.24	5.96
Choice	5.13	5.63	5.38
Mean	5.43	5.90	

Table 4: The Means of Willingness for Future Cooperation Scale

Summary of Logistic Regression

Variables	B	S.E.	Wald	df	Sig.	Exp(B)	% Correct	Nagelkerke R	Chi Square
GROUP	0.32	0.16	4.16	1	0.04	1.37	64.00	0.03	12.86
CHOICE	1.10	0.31	12.26	1	0.00	3.00	64.70	0.11	16.36

Table 5: The Summary of Logistic Regression for Accuracy Testing