Gender Difference in Effects of Conflict on Cognitive Change

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Abstract

The aim of this study was to examine whether gender difference mediates the effects of conflict on cognitive change through social interaction. Forty three undergraduate participants were divided into 10 groups and asked to jointly construct a "naïve path model" explaining intuitively the cause of Japanese teenager's aggression through discussion. They were also asked to personally construct a similar naïve model before and after the discussion sessions. These personal models were compared within subjects and the degree of change in the explanation was individually assessed. Coding the transcriptions of all discussion sessions, we counted the frequencies of utterance, for example, counter-arguing, interpreting, and agreeing etc. Examining the relationships between frequencies of something being uttered by others and the degree of change in the explanation, we found that the degree of change in the explanation correlated with the frequency of "being interpreted", but not with "being counter-argued". However, only in case of counter-argument, male and female samples showed different types of relationship with the degree of change in explanation. Specifically, whereas females had a negative relationship, males had a positive one. This result indicates that we need to examine effects of personal attributes affecting the interpretation of specific utterances to fully explicate the mechanisms of cognitive change through social interaction.

Theoretical Background

One of distinctive differences between inter-personal and intra-personal information processing is that the former includes an interpretation of the message. Due to this nature, a message cannot always be identical between senders and receivers in interpersonal communication (Bakhtin, 1979; Clark, 1997). This inconsistency of interpreted messages is partially attributed to the hierarchical nature of communication, as pointed out by the anthropologist Bateson (1972). In verbal communication, an uttered verbal message is not only determined by the literal meaning but also by the contingent information available in the context, such as countenance, manner, and intonation. The contingent information is used by the receiver as signals to determine how to interpret the uttered message, known as "meta-message". In addition, the process that meta-message determines the meaning of message is called "framing".

Following a theoretical frame developed by Bateson, socio-linguists have demonstrated that individual differences in cultural backgrounds, gender, and personal preferences strongly affect how to frame a message. For instance, in a small group discussion for problem solving, people sometimes engage in conflict. In this situation, some people might recognize it as a kind of game to compete with each other and feel it to be interesting. However, others might feel personal hostility from the conflict and be discouraged from being involved in these exchanges.

On the other hand, many researchers on cognitive development and conceptual change have examined the effects of certain verbal behaviors on cognitive change. For example, the facilitative effects on moral development of transactive discussion, which is largely characterized by reasoning that operates on the partner's statement, has been examined (Berkowitz, & Gibbs, 1983; Kruger, 1993). And Leitão (2000) demonstrated that counterargument in conversation has the function of slightly revising the original claim. All these studies have only focused on the functions of overt conversational moves and have largely neglected the covert interpretational aspects behind them. However, taking into consideration the fact that individual differences in personal backgrounds contribute to a variety of interpretations of one message, it is reasonable to infer that certain verbal moves works differently on knowledge construction processes depending on the personal attributes. If we know better what types of verbal move work different depending on what types of personal attribute, these findings would help to make our everyday discussion more effective.

In present study, it was explored whether the effect of certain verbal move on knowledge construction through collaborative reasoning interacts with the participant's personal attribute. Specifically, we

examined the effect of conflict, which was assumed to interact with gender differences, on the degree of cognitive change. The reason we focused on conflict is that conflicting utterances such as counter-argument have been intensively examined in order to explore their facilitative effect on cognitive change (e.g. Kruger, 1993; Leitão, 2000; Tomida & Maruno, in preparation). Concerning gender, sociolinguists (e.g. Tannen, 1994) have exemplified how two distinctive gender-related styles of conversation might lead to misunderstandings in conflicting talk between men and women. In general, it has been reported that male speakers have a competitive style and are inclined to engage in conflict and female speakers have a cooperative style and are inclined to avoid conflict (e.g. Tannen, 1996). Because of this difference in conversational style, if a man encounters the other's counter-argument, he would easily accept the conversational style and concentrate more on replying to the prior utterance. In case of a woman, however, she would try to avoid the conflict and less concentrate on replying. If these inferences are the case, gender difference is expected to mediate the effect of conflict. More specifically, men would change their beliefs or views through confrontations of counter-argument in conversation, but women would not.

To investigate this hypothesis, we used an available data set which was collected as a part of our project. This data set was consisted mainly of observational data, which was collected in small group discussion situation where the student participants were given the task of solving the ill-defined task collaboratively. The transcriptions from the data were coded and the frequencies of utterance categories were counted as personal scores. Then we compared the effects of these frequencies of utterance on cognitive change in terms of gender difference. As well as counter-arguing, we also examined the effect of interpretation. The reason is that interpretation is one of the cooperative activities which has been regarded as a key to cognitive facilitation in social interaction by developmental psychologists (e.g. Damon & Killen, 1982). Comparing the effects of counter-argument and interpretation, we can verify whether the assumed gender difference is specific to the effect of conflict or not.

In addition, we investigated participants' conversational style using self-rating scales to evaluate their behavioral tendency in an everyday context to ascertain the theoretical assumption adopted here. For this aim, a short version of Maruno-Kato Discussion Inventory (MKDI), which constituted of 13 scales to measure a wide range of factors including discussion skills, monitoring abilities, and attitudes/values toward discussion, was employed (see Appendix). Among these scales in skill domain, strategic inquiring, critical thinking, and discussing with fairness are related to behavioral tendency to engage in conflict. If the assumption adopted in this study is appropriate for the samples, it is expected that males would have higher scores on these conflict-related scales than females. As well as the self-rating scores, gender difference in frequencies of utterance is also expected. Similar to the self-rating scores, males would produce conflict-related utterances more often than females and females would do cooperation-related utterances more often than males.

Method

Participants

Forty-three undergraduate students (16 males and 27 females, M = 20.1 years old) enrolled in a psychology course, were asked to participate in our sessions. They received research participant credit for their introductory psychology course.

Questionnaire

A short version of the MKDI (64 items) was mainly employed. It consists of the three domains with (1) 6 scales for discussion skill (strategic inquiring, modulation of speech to the level of others' understanding, discussion goal directedness and necessary self-regulation, lack of interpersonal patience, critical thinking, and discussing with fairness), (2) 4 scales for different types of monitoring in discussion

Table 1 Main categories in coding scheme (translated and excerpted from Tomida & Maruno (2000)).

Coding categories	Brief descriptions
Suggesting	Providng one's own ideas which are relevant to the solution for the problems discussed there.
Counter-arguing	Providing one's own ideas in opposition to others' ideas.
Denying	Denying others' ideas without stating any reasons or alternative ideas.
Doubting	Doubting certainty of others' ideas or knowledge shared with the members.
Pointing out problems	Pointing out the problems in other's previously provided ideas.
Chiming in	Offering agreeable response to others when they are talking.
Interpretation	Interpreting what others mean by their previous utterances.
Confirming	Making sure whether he/she understands what others stated correctly.
Agreeing	Making responses which explicate that they hold same opinion to others.

situation (self/other monitoring, situational monitoring, collective monitoring, and time monitoring) and (3) 3 scales for attitude/value toward discussions (lack of self-confidence, valuing the importance of discussions, and self-obtrusiveness). Detailed descriptions of the inventory are shown in Appendix. Although other several questionnaires were administered at the same time, they were not examined here.

Procedure

Participants completed the MKDI one week before discussion sessions took place. They were asked to rate the MKDI items on a 7-point scale how descriptive statements are of themselves. Based upon their self-rating scores, participants were assigned into one of 10 groups (each including 4-5 members) so that the average level of discussion skill is equally counter-balanced among groups by their total MKDI score. A 10-minute session was repeated 3 times. Each group was told for the goal of their discussion session to come up with hypothetical causes for Japanese teenagers' aggressive behavior and to draw a naïve path-model that explains the causal relation among them using a whiteboard and markers. Before and after these discussion sessions, each participant repeatedly drew a naïve path model on a personal answer sheet, independent from the collective decisions of their own groups. The personally constructed path models before and after the group sessions were compared and the degree of change in knowledge domain included in these path models were assessed. All discussion sessions were videotaped.

Assessment of Change in Explanation To calculate the degree of change in the explanation, we initially coded explanations included in the path model which each participant constructed. The coding system we employed consisted of 24 domain categories including "lack of sympathy for others", "inability to tolerate frustration", and "exposure to violence in early childhood" (Tomida & Maruno, in preparation). After coding, each participant's number of domain category included in his/her path model was counted. All explanations were coded by the first author. About 20% of all explanations were randomly selected and independently recorded and the inter-rater reliability was calculated. The degree of agreement obtained was sufficiently high, Cohen's Kappa = .78. Finally, the number of domain categories which were adopted into each participant's naïve model and one which was rejected from his/her model through discussions was counted respectively. Both of these variables indicate the degree of change in the explanation. In this study, however, only the frequency of rejection was subject of further analysis because people easily adopt a new explanation category without any reflection and the frequency of adoption was considered inappropriate for the index of change in belief or view.

Coding of Discourse All videotaped discussions were transcribed. All transcriptions were coded by the first author with a coding scheme shown in Table 1. The analysis unit for coding was the conversational turn. Each turn was identified as one of the categories in the coding system. Total frequencies of utterance for each category were calculated as the speaker's personal score. In addition to the speaker's frequencies of utterance, frequencies of being uttered by others (e.g. frequency of being counter-argued by the other) were counted as the

Table 2 Gender differences in frequencies of utterance and the MKDI subscores in the skill domain.

		Male (N = 16)			Female (N = 27)			
		M	*SD*		*M*	*SD*	*t* value	*p* value
Cooperation-related utterance categories	Chiming in	7.19	2.24	<	13.33	1.72	2.18	0.04
	Interpreting	2.31	0.56		2.67	0.43		
	Comfirming	3.13	0.88		4.44	0.68		
	Agreeing	5.94	1.20		5.78	0.92		
Conflict-related utterance categories	Counter-arguing	2.63	0.57		1.63	0.44		
	Denying	0.38	0.15		0.11	0.11		
	Doubting	1.25	0.33		1.22	0.25		
	Pointing out problems	1.88	0.39		1.41	0.30		
MKDI subscales (skill domain)	Strategic inquiring	3.35	0.30	>	2.22	0.23	2.94	0.01
	Modulating of speech	4.48	0.28		3.98	0.22		
	Goal directedness & self-regulation	5.23	0.21		4.93	0.16		
	Critical thinking	4.25	0.30	>	3.38	0.23	2.29	0.03
	Discussing with fairness	4.73	0.22	>	4.13	0.17	2.21	0.03
	Lack of patience	4.63	0.34		4.73	0.26		

personal scores of the directed participant. To assess inter-rater reliability, about 20% of all sessions were randomly selected and independently recorded. The obtained degree of agreement was sufficiently high, Cohen's Kappa = .65 - .80 (M = .73).

Results and Discussion

Gender Difference in Utterance

Table 2 shows gender differences in frequencies of utterance and the MKDI sub-scores in the skill domain. As indicated in the upper part, the only significant effect of gender difference was found in the frequency of chiming in (t (41) = 2.18, p < .05). It indicates that females more frequently chimed in more frequently than males. On the other hand, as indicated in the lower part, the MKDI scores on strategic inquiring, critical thinking, and discussing with fairness were significantly higher in males than in females (t (41) = 2.94, p < .01; 2.29, p < .05; 2.21, p < .05). Concerning frequencies of utterance, hypotheses were only partially supported. However, scores on the conflict-related MKDI scales were clearly consistent with hypotheses.

Relationship between Self-rating Scores and Frequencies of Utterance

Table 3 shows correlations between the MKDI scores in skill domain and frequencies of utterance. All the scores on conflict-related scales have at least one significant relationship with conflict-related categories of utterance. On the contrary, there was no significant relationship between the other self-rating scores and any frequencies of utterance. It might indicate that the participants' general behavioral tendency of engaging in conflict was reflected in the discussion sessions we observed here.

Gender Difference in Effects of Utterance

Figure 1 is a scatterplot, which shows the relationship between frequency of being counter-argued by other participant and degree of change in explanation through

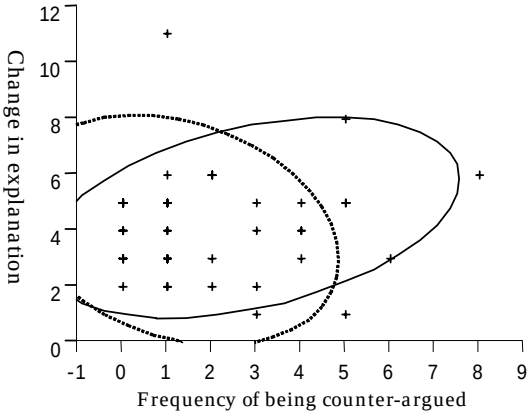

Figure 1: A Relationship between frequency of being counter-argued and degree of change in explanation.

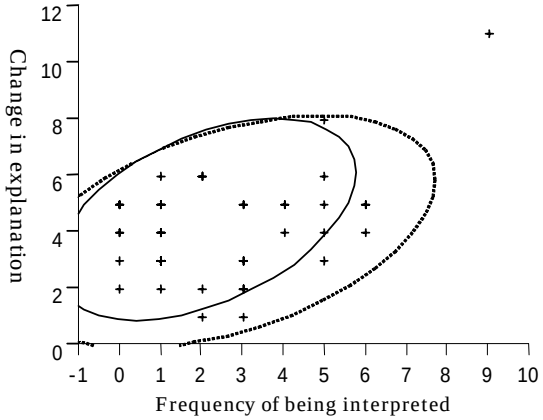

Figure 2: A Relationship between frequency of being interpreted and degree of change in explanation.

Table 3 Correlations between the MKDI sub-scores in the skill domain and frequencies of utterance.

MKDI subscales	Conflict-related utterance categories				Cooperation-related utterance categories			
	Counter-arguing	Denying	Doubting	Pointing out problems	Chiming in	Interpret-ing	Comfirm-ing	Agreeing
Strategic inquiring	.26 †	.11	.11	.09	-.08	.32 *	.04	.11
Modulating of speech	.14	.08	-.14	-.05	.01	.26 †	.12	.08
Goal directedness & self-regulation	.12	.04	-.16	-.02	-.10	.17	.30 †	-.20
Critical thinking	.25	.31 *	.35 *	.30 *	.07	.25	.21	.40 **
Discussing with fairness	.28 †	.36 *	.29 †	.13	-.18	.24	<.01	.18
Lack of patience	.14	.08	<.01	-.08	-.02	.26 †	.24	<.01

Note: † p < .10, * p < .05, ** p < .01.

discussions. The ellipses fitted to the plot indicate bivariate normal distribution with 90% probability. The ellipse with a solid line shows male samples' distribution and a dotted line shows female samples' distribution. When we calculated correlation coefficient with all samples, there was no correlation (r = .04). However, when samples were divided into male group and female group, two different types of relationship emerged. As shown in Figure 1, whereas female samples have a negative relationship (r = -.26, p = .18), male samples have a positive relationship clearly (r = .39, p = .13). Even though sufficient statistically significant levels were not achieved, the gender difference was prominent. However there is possibility that the negative correlation in females due to an outliner. To eliminate this possibility, we re-calculated the correlation without the outliner. As a result, we obtained r = -.34 (p = .08) with female sample. It was found that the gender difference we obtained was not an artifact.

On the other hand, as shown in Figure 2, a bivariate distribution between the frequency of being interpreted and the degree of change in explanation was clearly different. Both the relationship in male samples (r = .47, p = < .10) and the corresponding in female samples (r = .45, p = < .05) were highly consistent with the combined samples (r = .43, p = < .01). Based on the theoretical assumption employed here, these results could be interpreted as evidence that gender difference in the framing process of conflict-related utterance made males engage more in the explorative process. However, the interest of this paper is not limited for the effects of gender difference themselves. Rather, the implication we draw from the data is that specific personal attributes such as gender difference can mediate interpretation of messages in verbal interaction for problem-solving.

Limitations and Conclusion

This study has the following limitations. As we utilized an available data set, a number of samples large enough to generalize the results obtained here wasn't collected at the present moment. In addition, we have not operationalized the utterance categories which are closely related to coordination. Furthermore, we haven't operationalized the personal background which was assumed to be used to frame other's utterance and the reflection process in the framing. Finally, the results shouldn't be interpreted that one gender is more in favor of discussion or problem solving than another.

Despite these limitations, we found a substantial gender difference in the facilitative effect of conflict on cognitive change and the gender differences in verbal behaviors partially backing up the theoretical assumption we employed here. These results indicate, we think, that the framing process should be taken into consideration to have a better understanding of conflict's effect on cognitive change.

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Appendix The MKDI sub-scales in the skill domain (Kato & Maruno, 2000, Translated from Japanese version).

Subscales	Brief Descriptions	Sample Items
Strategic inquiring	Skills that one can pose opposite ideas or views to others intentionally, aiming at extention of others' ideas or revitalization of the discussion.	1. To revitalize discussions, I intentionally pose opposite opinions/ideas. 2. To make people aware of the crucial issue here, I intentionally pose opposite opinions/ideas. 3. To check on others' understanding, I intentionally pose opposite opinions/ideas.
Modulation of speech to the level of others' understanding	Ability to modulate one's own speech to the level of others' understanding, by changing the vocabulary or the method/complexity of the explanation.	1. Depending on the level of others' knowledge, I try to modulate the way I speak. 2. I try to choose expressions and explanation so that others would better understand me. 3. Depending on the level of the others' knowledge, I change my words and ways of explanation.
Goal directedness and necessary self-regulation	Ability to check the direcition of the discussion and ability to bring one's own or the group's speech back in line with the direction of the original goal.	1. When my opinion gets out of tune with what others are discussing, I try to figure out how I got off the line. 2. I try to think what the essential issue is for the discussion. 3. When our discussion keeps doubling back on itself and gets nowhere, I try to think for what purpose we begin our discussion in the first place.
Critical thinking	Ability to think skeptically about what is believed to the truth or a fact.	1. I try to be skeptical of what is believed to be a fact. 2. I try to think critically of what is believed to be a fact. 3. I try to doubt what people usually assume to be true.
Discussing with fairness	A personal tendency to say what they think, even when their speech would lead to negative results such as putting the speaker in bad positions or effect the social relationships negatively.	1. Even if I might be held for responsible, I would dare to express the opinions I believe in. 2. Even when I would be put in a bad position, I would express my opinions with fairness. 3. My concern with possible negative consequences on our relationship stops me from expressing my honest opinions.
Lack of interpersonal patience	A personal tendency to be impatient at social interactions and to readily get frustrated with other's behavior.	1. I tend to chip in when I get frustrated with others' slow understanding. 2. I tend to chip in on others' talking. 3. I get frustrated when others think slowly.