Unifying Conflicting Perspectives in Group Activities: Roles of Minority Individuals

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Abstract

For drawing higher-level perspectives in group activities, resolving conflicts among group members is crucial. We investigated group activities with four members wherein one member had a different perspective from the other three. Four members engaged in a rule discovery task in which they were required to unify conflicts for the solution. Through two experiments, we investigated two hypotheses: 1) Innovative high-level perspectives are more likely to emerge from a minority individual than from the majority of group members, 2) Group members on the majority side might tend to have more egocentric perspectives than an individual on the minority side. Both hypotheses were supported.

Keywords: Emergence, Minority, Majority, Group problem solving.

Introduction

In group activities, conflicts often occur among group members. Indeed, such conflicts are important for bringing innovative ideas into a group by overcoming each member's fixed, old thoughts. A group found new ideas by producing a unified meta-perspective while resolving group members' contradictory local perspectives.

Many studies on divergent thinking have confirmed conflicts' important functions (Van Dyne & Saavedra, 1996; Dreu, 2002). In studies of creativity, many researches have indicated that unifying two conflicting concepts, which seem not to share any common properties and, therefore, are difficult to merge is important for finding new innovative ideas and designs (Finke, Ward, & Smith, 1992). Additionally, in insight problem solving, problem solvers' thought processes are tightly fixated by mental blocks that prevent them from achieving new solutions (Sternberg & Davidson, 1995). They face many unexpected counter examples that conflict with their viewpoints. To reach new solutions, they need to relax mental blocks and find a new perspective that resolves these conflicts. Similarly, the philosophy of science has indicated that anomalies are crucial for constructing new theories. Anomalies are defined as instances that break the symmetry of a classical theory, meaning that anomalies produce conflicts in current theory. Historical studies indicate cases of innovative scientific theory constructed through the resolution of such conflicts (Chinn & Brewer, 1993). Empirical studies also support the notionthat surprising results not predicted by a hypothesis play a crucial role in scientific discovery (Kulkarni & Simon, 1988).

Such conflicts more often emerge in a heterogeneous group with different perspectives. Preceding studies on pair problem solving have indicated that the important factor for finding new ideas is one member having a different perspective from the other (Shirouzu, Miyake, & Masukawa, 2002; Miwa, 2004). In group activities, organizational studies have indicated two types of conflicts: relationship and task conflicts (Simons & Peterson, 2000). Relationship conflicts come from differences in group members' personalities and task conflicts from differences in members' perspectives on and ideas for the task. Research has indicated that task conflict brings about positive effects by drawing out new solutions unifying the variable viewpoints that caused conflict (Tjosvold, Hui, Ding, & Hu, 2003). In such group activities, each member experiences difficulties in accepting other members' ideas and different perspectives. Such contradictions bring about conflicts in group interactions and improve interactive processes through which new innovative ideas emerge.

In this study, we investigated activities of groups comprising four members in which one individual had a different perspective from the other three members. The following is our research questions: In such group activities, with asymmetry among group members' opinions, does a high-level perspective emerge from a minority individual or from majority three members? Nemeth indicated that minority views foster greater thought about an issue, leading to divergent rather than convergent thinking (Nemeth & Wachtler, 1983; Nemeth, 1986). Meyers, et al., also confirmed that minorities produce significantly more arguable opinions, disagreement-relevant intrusions, and qualifiers than majority members do (Meyers, Brashers, & Hanner, 2000). These findings guide the following first hypothesis:

- Hypothesis 1: Innovative high-level perspectives are more likely to emerge from a minority individual than from group members on the majority side.

Conflicts are valuable, but also produce miscommunication and misunderstandings among group members, potentially

causing negative effects in group activities. Group members need to find a meta-perspective that unifies conflicted lower-level different perspectives. To produce a high-level perspective, each member must understand other members' perspectives in the initial stage of arguments. Studies in psycholinguistics have indicated that people tend to be biased by egocentrism (Keysar, Barr, Balin, & Brauner, 2000). Egocentric people are unable fully to understand other people's opinions and are attached to biased facts that can differ from reality. Previous research has consistently indicated that majorities generally exert a greater and more direct influence on group decisions that also leads to an unreflective acceptance of the majority position (Wood, Lundgren, Ouellette, Busceme, & Blackstone, 1994; Meyers et al., 2000). To overcome egocentric views, reflective and deliberate thinking is crucial. This determines our second hypothesis:

- Hypothesis 2: Group members on the majority side might tend to have more egocentric perspectives than an individual on the minority side.

This point, i.e., understanding other members' perspectives by escaping egocentric views, is crucial because the current study investigate group activities when very serious conflicts occur in a group. Many previous studies have also examined such activities. However, each member's misunderstandings of other group members in the current study were more serious compared to preceding studies. The conflicts that are investigated in the current study are characterized by incommensurability. An individual on one side had a completely different perspective that could not be understood by individuals on the other side. In the initial stage of discussion, arguments among them could not be resolved.

Further more, we investigate these group activities compared to collaborative activities by a pair of individuals. Specifically, if Hypothesis 1 is supported, we assume two possibilities: A minority individual's performance in finding a high-level perspective would be better than pair's performance as the baseline performance, or majority's performance would be worse than the baseline performance. No previous research was found, and we have no hypotheses about this research question.

Experimental design

We used a modified version of the experimental design developed by Hayashi and Miwa (2009), in which pairs of participants with different perspectives engaged in a rule discovery task.

How to produce conflicts

Figure 1 shows an example pair of two stimuli, one presented to a minority individual and the other to majority participants. The diagrammatic arrangements of "components" of both stimuli are identical within the dotted square, but one against the white background might be perceived differently from the other against the black background. In this case, one participant perceives seven black components (i.e., black perspective), but the other perceives five white components (i.e., white perspective), causing conflicts between the two participants. Participants were required to notice the other participant's perspective by finding the distinction of the background color. Before the experimental session, it was stressed that stimuli within the fixation (dotted) square were physically identical, but the background color outside the square was not mentioned. With this understanding of the experimental situation, participants could unify their contradictory perspectives and shift to a higher unified perspective that resolved the conflicts.

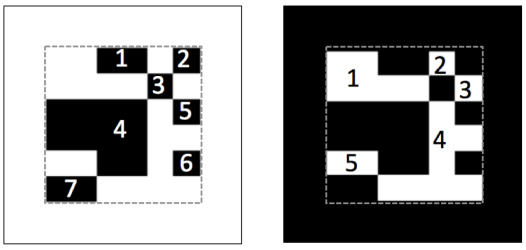


Figure 1: Example stimuli with two different perspectives.

Stimuli

In the present study, one participant was assigned to a minority role and the other three to a majority role. Either a white or a black perspective was given to each side by controlling the background color. Experimental stimuli were presented on a monitor placed in front of each participant. A workspace was provided for each member, separated from others by separator panels. Therefore, each member could not notice different background color on other members' monitors. Conversations among members were easily made.

For introducing a context that motivated participants to resolve conflicts, participants engaged in a rule discovery task. In the experiment, stimuli were presented sequentially (see Figure 2). For each stimulus, a square outer box was displayed for one second, followed by a stimulus picture presented inside the box frame. Participants were allowed to converse freely about the stimulus pattern presented on their monitor. When all members agreed to move to the next stimulus, or when 120 seconds had passed, another stimulus was presented.

Rule setting

Participants were required to find regularity in a sequential pattern of the number of components. In Figure 2, the pattern of the black components are 3, 4, and 5. The sequential rule does not exit in one color of components; regularity emerges across both colors of components. Specifically, Table 1 shows a stimuli presentation sequence in which regularity in a sequence of the sums of black and white components was manipulated (i.e., 6, 8, 10, and 12 in the bottom column).

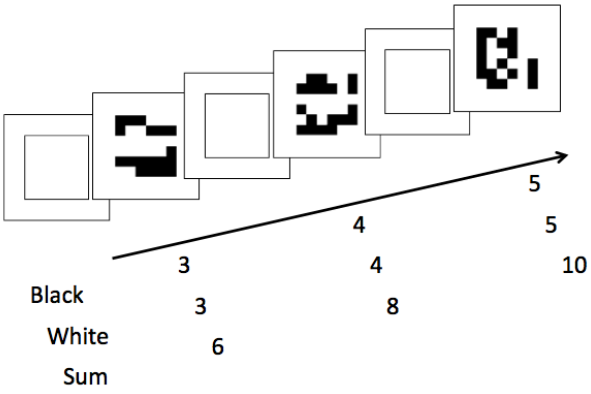


Figure 2: Series of stimuli presented on the black perspective side.

Table 1: Example sequences of the number of components.

	Introductory					Contradictory				
Black	3	4	5	6	...	2	2	6	5	...
White	3	4	5	6	...	4	6	4	7	...
Sum	6	8	10	12	...	6	8	10	12	...

Introductory phase: The introductory phase was established to let participants believe their own perspectives were correct. A sequence in white (or black) components was individually manipulated (i.e., 3, 4, 5, and 6) while regularity in a sequence of the sums of black and white components was maintained (i.e., 6, 8, 10, and 12). In the introductory phase, even though participants had different perspectives, no conflicts occurred because each continuously reported the identical sequence of the number (i.e., 3, 4, 5, and 6) to the others.

Conflict phase: After the 17th trial, regularity in the number of each color of components was broken: 2, 2, 6, 5 in black, and 4, 6, 4 and 7 in white, leading to conflicts among participants, but regularity in the sums of black and white components was still maintained (i.e., 6, 8, 10, and 12). The session was terminated after all members agreed on the regularity found in paired components (i.e., 6, 8, 10, and 12), or time for the problem-solving phase exceeded 60 minutes.

Post questionnaire

After the problem-solving phase, we conducted a questionnaire in which we asked participants why the conflicts in the problem-solving phase occurred. In particular, participants' understanding was tested on how precisely they understood the arrangement of components on other members' screens. An arrangement of components on their own screen was presented on the questionnaire sheet (Figure 3 (a)), and they were required to draw an arrangement of components from the other members' screens. The depicted figures were categorized into four types (Figure 3 (b)), each of which was characterized by background colors, and black and white assignment to components.

Previous studies found that typically, participants drew incorrect pictures as in Figure 3 (b2). In the picture, the background color was correctly identified but the colors of corresponding components, which should have been physically identical, were opposite. The picture contradicted the instruction that each diagrammatic pattern inside the fixation square for each participant was identical for the other members. This reversed figure was interpreted as evidence of participants' egocentric understanding.

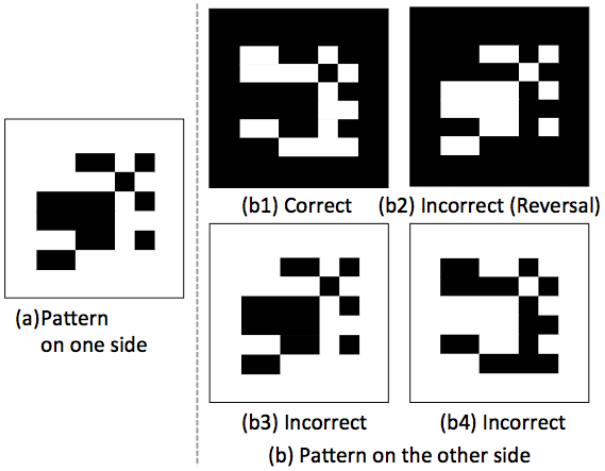


Figure 3: Four diagrammatic patterns depicted in post questionnaire.

In Experiment 1, we also recorded the participants' protocols. This secondary data will be examined in the discussion section.

Experiment 1

Participants

Thirty-eight undergraduates participated in Experiment 1. A total of 10 groups, i.e., eight groups consisting of four members (one as a minority individual and three as a majority group) and two groups consisting of three members (one as minority and two as majority), were constructed.

Results

Our main concern was whether the participants understood the other members' perspective for unifying and resolving the conflicts. Therefore, in the experiment, we did not record whether each individual found the sequential rule. Rules were not examined by individual members but rather discussed by groups. The result shows eight of the ten groups found the target rule: i.e., the sequential pattern of the sums of black and white components.

We scored the post questionnaire based on two criteria: first, whether the arrangement of components inside the fixation square was correctly drawn; second, whether the background color out of the fixation square was correctly drawn.

Table 2 shows the results. Fisher's exact analysis shows a marginally significant difference in the distribution between minority individuals and majority groups for the component color identification ($p < 0.10$) and a significant difference for the background color identification ($p < 0.05$).

The table shows that more individuals on the minority side drew correct figures in the questionnaire than did majority groups, thus confirming that individuals on the minority side understood the majorities' viewpoints and acquired a higher unified perspective that resolved the conflicts. This result supports our first hypothesis.

Table 2: Distribution of the number of participants who drew the correct and incorrect figures in Experiment 1. Parentheses show the ratios of participants.

	Components		Background	
	Correct	Incorrect	Correct	Incorrect
Minority	6 (.60)	4 (.40)	8 (.80)	2 (.20)
Majority	8 (.29)	20 (.71)	12 (.43)	16 (.57)

We also analyzed the degree to which the reversed figure (Figure 3 (b2)) was drawn on the questionnaire sheets. Table 3 shows the distribution of the number of participants who drew the reversed figure. Fisher's exact analysis shows a significant difference between minority individuals and majority groups in the distribution ($p < 0.05$). The table indicates that more majority members drew the reversed figure, thus implying that they tended to take egocentric viewpoints more often than did minority individuals. This result supports our second hypothesis.

Table 3: Distribution of the number of participants who drew the reversed figure in Experiment 1. Parentheses show the ratios of participants.

	Reversal	Others
Minority	1 (.10)	9 (.90)
Majority	15 (.54)	13 (.46)

Experiment 2

We conducted Experiment 2, adding a symmetric interaction condition in which a pair of participants solved the same experimental task as in Experiment 1. Additionally, we were interested in interaction processes in which the concern was whether the reversed figure, prominently observed in Experiment 1, increased or decreased from the initial stage to the final stage of problem solving. We expected that through the development of problem solving, misunderstandings would be gradually corrected, and then the reversed figure would decrease. If so, the reversed figure may function similarly as other incorrect figures do. However, if the reversed figure increased, they may have specific functions such as acting as a medium for bridging across misunderstanding to acquire the correct understanding.

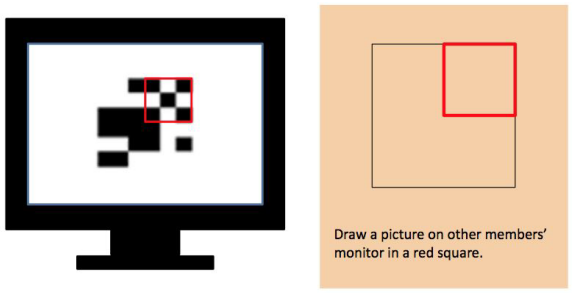
Participants

A total of 39 undergraduates were assigned to the asymmetry group conditions, in which nine groups consisting of four members (one as a minority individual and three as a majority group) and one group consisting of three members (one as minority and two as majority). Twenty undergraduates were assigned to the symmetry pair condition in which 10 pairs were constructed.

Procedures

The experimental procedures were almost identical to those in Experiment 1.

One procedure was added to capture participants' transition processes from misunderstandings to correctly noticing other members' perspective. Specifically, at the end of every trial (i.e., a set of the presentation of the outer square and the experimental stimulus), the participants were asked to answer an intermediate questionnaire. Figure 4 shows an example shot of the monitor and an experimental sheet from the intermediate questionnaire. A quarter area of the experimental stimulus was outlined within a red square. Participants were asked to draw the stimulus pattern in the same area of the other members' monitor on the experimental sheet.



(a) An example shot on participant's monitor (b) An example experimental sheet in intermediate questionnaire.

Figure 4: An example shot of the monitor screen and an experimental sheet from the intermediate questionnaire.

Results

In Experiment 2, eight of ten pairs in the symmetry pair condition found the target rule, but only three of ten groups in the asymmetry group condition did ($p < 0.05$: Fisher's exact analysis).

Table 4 shows the distribution of participants who drew the correct and incorrect figures in the post questionnaire. A chi-square test shows a significant difference in the distribution for the component color identification ($\chi^2(2) = 15.61$, $p < 0.01$), but does not for the background color identification

($\chi^2(2) = 4.47$, n.s.). We did not confirm that the performance of minority individuals is superior to that of pairs; on the other hand, the performance of majority groups is much worse than that of pairs.

Additionally, Table 5 shows the distribution of participants who drew the reversed figure in the post questionnaire. A chi-square test shows a significant difference in the distribution ($\chi^2(2) = 13.86$, $p < 0.01$). The result indicates that more majority members drew the reversed figure than pairs did. However, the results do not indicate that fewer minority individuals drew the reversed figure more than pairs did.

Table 4: Distribution of the number of participants who drew the correct and incorrect figures in Experiment 2. Parentheses show the ratios of participants.

	Components		Background	
	Correct	Incorrect	Correct	Incorrect
Pairs	17	3	17	3
	(.85)	(.15)	(.85)	(.15)
Minority	5	5	8	2
	(.50)	(.50)	(.80)	(.20)
Majority	8	21	17	12
	(.28)	(.72)	(.59)	(.41)

Table 5: Distribution of the number of participants who drew the reversed figure in Experiment 2. Parentheses show the ratios of participants.

	Reversal	Others
Pairs	3 (.15)	17 (.85)
Minority	5 (.50)	5 (.50)
Majority	20 (.69)	9 (.31)

Both results consistently confirm that majority group members were more egocentric and less accurate at understanding other members' perspective, but do not support that minority individuals were more sophisticated at unifying the multiple perspectives than were pairs as the baseline condition.

Next, we analyzed the intermediate questionnaire for capturing the transition process of correcting the misunderstandings. We divided the trials from the initial through final wherein the participants terminated the experiment into three stages: initial, middle, and final. Figures 5 (a) and (b) show the average rates of the reversed and other incorrect figures in the initial, middle, and final stages of problem solving.

First, for incorrect figures other than the reversed figure in Figure 5 (b), there were significant main effects of both the stage and the condition factors ($F(2, 112) = 23.06$, $p < 0.01$; $F(2, 56) = 6.92$, $p < 0.01$), but no significant interaction ($F(4, 112) < 1$, n.s.). The gradual decrease of the ratio of incorrect figures is reasonable because it means that misunderstandings were progressively corrected.

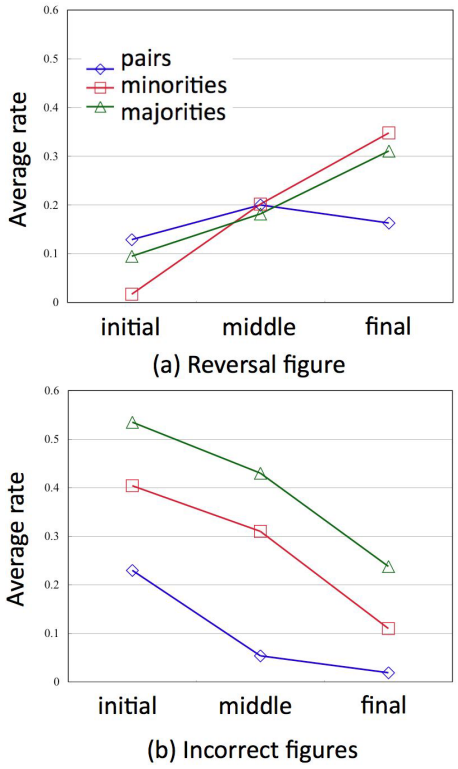


Figure 5: Transition of occurrence rates of reversed and other types of incorrect figures.

On the other hand, the gradual increase of the reversed figure is interesting. In Figure 5 (a), there was a significant main effect of the stage factor ($F(2, 112) = 7.52$, $p < 0.01$), but neither a significant main effect of the condition factor nor an interaction between the two factors ($F(2, 56) < 1$, n.s.; $F(4, 112) = 1.62$, n.s.). This result shows that the reversed figure gradually increased in the development of problem-solving. This point is discussed in detail later.

Discussion and conclusions

Overall results support our two hypotheses. Experiment 1 supported that minority individuals noticed a unified perspective that resolved the conflicts occurring among group members more often than did majority group members. Majorities tended to misunderstand the causes of the conflicts due to their egocentric viewpoint. These findings are consistent with preceding minority and majority studies (Nemeth & Wachtler, 1983; Nemeth, 1986; Wood et al., 1994; Meyers et al., 2000). Previous studies focused mainly on judgment patterns of third parties who were exposed to minority or majority opinions. Meanwhile, in the current study, by employing the deliberate experimental paradigm, we investigated how minorities and majorities formed their ideas through their interaction processes.

In Experiment 2, majorities showed poorer performances at understanding other members' perspective compared with

the pairs in the baseline condition. Studies in social psychology have indicated negative impacts of group activities such as the Ringelmann effect and social loafing (Karau & Williams, 1993). These phenomena indicate losses of motivation and coordination of group members, which in turn diminish the total performance of a group. These aspects that emerge in a homogeneous group may bring about negative impacts on members on the majority side.

In our experiments, the participants engaged in dual tasks. One task was to explore the reasons for conflicts and resolve them by unifying the conflicted multiple perspectives. In the second task, the participants also engaged in a rule discovery task for finding a regularity of the number of components in the experimental stimuli.

As we mentioned before, in Experiment 2, the performance of the asymmetry group in finding the regularity was much poorer that of the symmetry pair. In the seven unsuccessful groups in the asymmetry group condition, a total of twenty participants were assigned on the majority side, revealing very poor performance for noticing the minority individual's perspective. Specifically, only five of twenty participants noticed the background color of the minority perspective, and ten of twenty correctly draw the diagrammatic pattern of components.

Experiment 2 confirmed that with the development of problem solving, the participants gradually reported the reversed figure, meaning that the reversed figure was generated through group interaction processes. In both experiments, majorities drew more reversed figures. Through what processes did they misunderstand causes of the conflicts? To understand this point in more detail, we transcribed participants' verbal protocols recorded in Experiment 1. We focused on a set of terms relating to "reversed" such as invert, opposite, reverse, and turn over. These terms may be interpreted differently based on each problem-solving context. In correctly understanding situations, these terms may be understood as the figure/ground reversal of components caused by the change of the background color. However, in misunderstanding situations, these terms were construed wrongly as simple reversals of colors of the components, white to black and black to white, thus, causing the reversed figure. As a result of analysis, 13 out of 20 members on the majority side mentioned these terms, and 77 % (10 out of 13) of those drew the reversed figure. However, none of five minority individuals who mentioned those terms drew the reversed figure. We assume that the latter interpretation, i.e., simple changes of colors of the components, was more intuitive without deep consideration; whereas, the former, i.e., the figure/ground reversal by the background color, was more sophisticated and required deliberate thoughts and deeper understanding about causes of conflicts. Majorities who tend to be biased by their egocentric view may quit their deliberate thinking to correctly understand conflicting situations.

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