Research Collection School of Social Sciences   School of Social Sciences

9-2010

A Multilevel Model of Minority Opinion Expression and Team Decision-making Effectiveness

Guihyun Grace PARK
Singapore Management University, gracepark@smu.edu.sg

Richard D. DESHON
Michigan State University

A Multilevel Model of Minority Opinion Expression and Team Decision-Making Effectiveness

Guihyun Park, Department of Psychology, Michigan State University

Richard P. DeShon, Department of Psychology, Michigan State University

Abstract: The consideration of minority opinions when making team decisions is an important factor that contributes to team effectiveness. A multilevel model of minority opinion influence in decision-making teams is developed to address the conditions that relate to adequate consideration of minority opinions. Using a sample of 57 teams working on a simulated airport security-screening task, we demonstrate that team learning goal orientation influences the confidence of minority opinion holders and team discussion. Team discussion, in turn, relates to minority influence, greater decision quality, and team satisfaction. Implications for managing decision-making teams in organizations are discussed.

Keywords: goal orientation, minority influence, team effectiveness, teams, minority opinions, team decisions.

Team discussion is a common and important component of decision making in organizations. The widespread use of team discussion for decision making is due, in part, to the belief that teams make better decisions than individuals because teams use a larger pool of relevant information (Baron & Kerr, 2003; Forsyth, 2006; Hinz, 1990), increase opportunities to identify and correct mistaken assumptions, factual errors, and reasoning errors (Zimbardo, Butler, & Wolfe, 2003), and increase opportunities to learn from other members' perspectives, build shared understandings of the task, and facilitate coordination of members' behaviors (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995).

Despite its popularity, team decision making frequently fails to yield the expected gains in decision accuracy, and the process often results in lower satisfaction for team members (Hackman, 1988; Ilgen, Major, Hollenbeck, & Sego, 1995). Some of the most striking examples of ineffective team decisions can be found in the groupthink literature: the Challenger space shuttle tragedy, the failed invasion of Cuba by the United States (i.e., the Bay of Pigs), and the targeting of innocent civilians in Vietnam (Janis, 1982). More recently, the Enron scandal, which resulted in the loss of thousands of jobs, more than $60 billion in market value, and more than $2 billion in pension plans, stemmed in part from the poor group decision making of its board of directors ("Burden of Enron," 2006).

One reason why the expected positive outcomes of team discussion are often not realized is the failure to consider dissenting or minority opinions. The expression of minority opinions helps teams make quality decisions by preventing them from prematurely moving toward consensus (Nemeth & Chiles, 1988) and encourages teams to develop multiple perspectives on issues that contribute to higher quality decisions (De Dreu & West, 2001). In addition, when minority opinions are considered, the holders of the minority opinion perceive greater control in the decision process, resulting in increased satisfaction and greater willingness to remain a part of the team (Drake & Mitchell, 1977; Parker, 1993). Therefore, to improve team decision-making effectiveness, it is necessary to better understand the processes that result in the fuller consideration of minority opinions in team discussions.

Multilevel Process Model

The existing literature clearly demonstrates the importance of incorporating minority opinions into the team decision-making process. However, relatively little is known about the variables that relate to minority influence and how these variables translate into effective team decision making (e.g., De Dreu, 2007; Martin & Hewstone, 2001). Given that the expression of minority opinions occurs in the context of team decision making, a multilevel perspective of the process is needed. Specifically, the team provides a top-down context for the members of the team. Team level variables likely influence the willingness of the minority opinion holder to express the opinion. Bottom-up processes also function at the same time because individuating characteristics of the minority opinion holder likely relate to the individual's decision to express the minority opinion, and once expressed, the minority opinion likely influences the ensuing team discussion. The current article suggests that team goal orientation is likely a potent state related to the multilevel processes of the minority influence.

Figure 1 presents our multilevel model of minority opinion expression and team decision-making effectiveness. We argue that team learning goal orientation influences team discussion, and it also should influence minority opinion holders' confidence. The confidence of minority opinion holders, in turn, affects the likelihood of minority opinion expression and facilitates team discussion. Team discussion should result in increased minority influence. Finally, minority influence is associated with

better team performance and greater team satisfaction. Each of these relationships is expanded on in the following section.
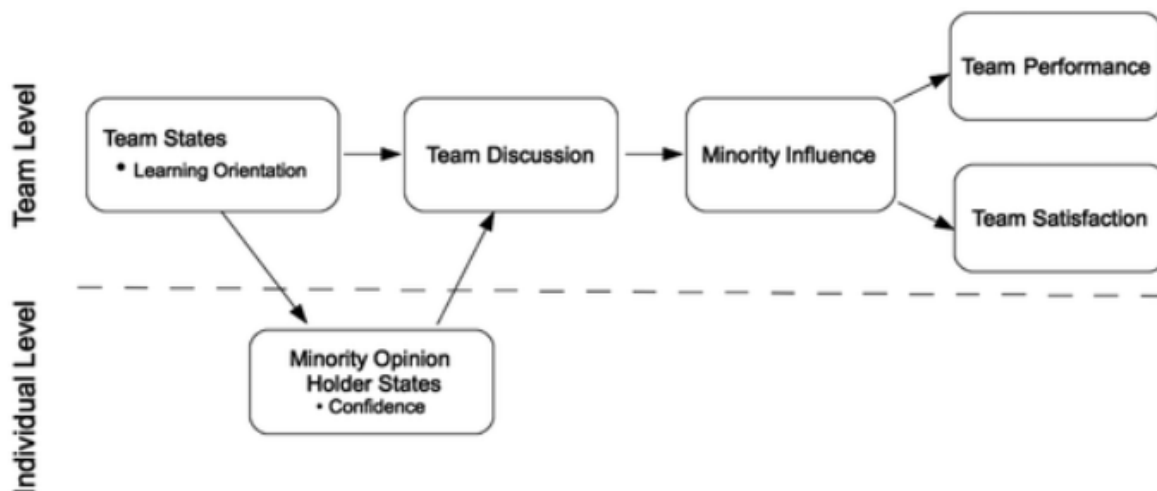

Figure 1. Multilevel model of minority opinion expression and team effectiveness.

Minority Opinion Holder Confidence

Minority opinions can increase team decision quality by initiating the discussion of alternatives and expanding the team's knowledge base (Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Moscovici, 1985). This process can be beneficial even if the minority opinion is inaccurate (Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, & Frey, 2006). For this beneficial process to occur, however, the minority opinion holder must first express the opinion, and then the team must discuss the opinion and related issues. An important individual-level variable relating to both the likelihood of minority opinion expression and the team's reception of the expressed opinion is the minority opinion holder's confidence in his or her opinion.

Nemeth and Kwan (1987) highlighted that the confidence of minority team members in their opinion relates to a greater willingness to share their opinions that, in turn, leads to greater minority influence on team decisions. Further, the confidence with which minority opinions are expressed can influence the consideration that the opinion receives from other team members. Kerr (2001) argued that minority opinion holders who show confidence can compensate for their lack of popularity and exert influence over the majority faction. He explained that people infer the substance of an opinion from the presenter's behavioral style (Kerr, 2001). A minority opinion receives little attention from other team members if the opinion holder is not confident and quickly succumbs to the normative pressure of following the majority opinion. Similarly, Nemeth and Wachtler (1974) also found that a group is more likely to consider minority opinions when the opinion is expressed with confidence. Therefore, we hypothesize the following:

Hypothesis 1: Minority opinion holders' confidence is positively related to team discussion.

Team-Level Learning Goal Orientation

Many possible team-level variables influence team discussion and the internal states of the team members (individual level) involved in the discussion. As we discuss next, team learning goal

orientation (e.g., DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004) is a particularly promising variable that is likely related to team discussion both directly and indirectly through its relationship with minority opinion holder confidence. Teams with high levels of learning goal orientation have a shared perception that their teams are aiming to develop their competence by seeking out challenges and using errors as opportunities to increase task understanding. Analyzing qualitative coding of text messages exchanged during team discussion, LePine (2005) found that learning goal oriented teams were more likely to communicate openly regarding alternatives and were eager to determine the causes of discrepant information. Teams with a high learning goal orientation are more likely to view the sharing of opinions as an effort to improve the team decision rather than to interfere with it. In addition, teams with high learning goal orientation exert less normative pressure and, as a result, minority opinions are more likely to be regarded as opportunities for learning than as threats to the majority. On the basis of these arguments, we hypothesize the following:

Hypothesis 2A: Team learning goal orientation is positively related to team discussion.

Team learning goal orientation is also likely related to minority opinion holder confidence. Teams with a high learning goal orientation focus on developing competence and view errors and mistakes as diagnostic information rather than indicators of incompetence. As a result, they are more likely to perceive different opinions as opportunities to learn about the task rather than viewing minority opinions as threats. LePine (2005) found that teams with a high learning goal orientation were more likely to be respectful toward and supportive of team members who make mistakes. The open and constructive discussion environment that occurs in high learning goal oriented teams makes it possible for minority opinion holders to develop and enhance their opinion confidence and participate in discussions of alternatives (Edmondson, 2002). Papaioannou and Kouli (1999) manipulated team learning goal orientation by making students who worked as members of a four-person sports team focus on developing task-related competencies; the results demonstrated that individuals who perceived their teams as having a high learning goal orientation showed a high level of self-confidence on the task. In summary, when teams have a high learning goal orientation and support different views, individuals are less likely to have normative concerns, allowing the development of increased confidence. Therefore, we hypothesize the following:

Hypothesis 2B: Team learning goal orientation is positively related to minority confidence.

Team Discussion and Minority Influence

Stasser and Titus (1985) suggested that team discussion could be understood as an information-sampling process from the combined pool of information held by the team members. They suggested that shared information has a greater chance of being mentioned in the initial stages of such a discussion. However, as the pool of shared information is depleted in the early stages of the discussion, the chance of mentioning unique information increases. Supporting this notion, Campbell and Stasser (2006) found that, as teams spend more time in discussion, the probability of minority opinions being discussed increases. Larson, Foster-Fishman, and Keys (1994) found that teams in a training condition that were instructed to spend time scrutinizing and elaborating each member's opinion discussed a greater amount of unshared information during team discussion. Finally, Kerr and Tindale (2004) suggested that allowing sufficient time for decision-making groups' discussion facilitates information exchange and decreases bias toward shared information. Thus, low levels of team discussion may result in teams agreeing prematurely on decisions while ignoring the contribution of unique opinions, thus increasing the bias toward shared information. Conversely, increased discussion among team members allows a balanced perspective of opinions of both majority

and minority factions, which relates to a greater influence of minority opinions on team decision. Thus, we hypothesize the following:

Hypothesis 3: Team discussion is positively related to minority influence on team decisions.

Minority Influence and Team Effectiveness

Team decision-making processes that adequately consider minority opinions also result in increased team decision quality and team member satisfaction with the team. Extensive research on team decision making has demonstrated the positive effect of minority influence on team decision quality (e.g., De Dreu & Beersma, 2001; Nemeth & Chiles, 1988; Schwenk, 1990). Minority dissension encourages teams to consider multiple perspectives and alternatives, thereby helping team members increase their understanding of the task (De Dreu & Beersma, 2001). Nemeth and Chiles (1988) suggested that confronting the minority opinion prevents teams from prematurely reaching a consensus, which facilitates the discovery of better alternatives. In addition, minority opinions give teams the opportunity to question current beliefs and help detect errors in their assumptions (Schwenk, 1990). Therefore, members on teams that allow the minority to influence team decisions have a greater chance of finding more correct answers, leading to greater performance within the team.

In addition, minority influence on team decisions facilitates team members' feeling of esteem and control and increases members' satisfaction with the team as a whole. Minority opinion members' influence on team decisions indicates reduced conformity pressure in the team in that members do not feel obligated to follow others' opinions because they happen to be endorsed by the majority faction (De Dreu & De Vries, 1996). Thus, greater minority influence on team decisions implies reduced conformity pressure, which provides members with the opportunity to express their opinions and freely engage in the discussion without feeling intimidated by the judgments of other members (Edmondson, 1999). As such, members have the opportunity to maintain their self-esteem and develop feelings of being respected by other members, which should positively influence their satisfaction (Miller & Monge, 1986). Morrison and Milliken (2000) suggested that, when individuals are subject to social cues that discourage their opinions, they develop a perceived lack of control over the situation and decreased satisfaction. Similarly, Parker (1993) found that nurses who believed their dissenting opinions would be heard have a greater sense of control and show less intention of leaving the organization. Therefore, members on teams that allow the minority to influence team decisions have greater feelings of being respected by other members, which relates to greater satisfaction with the team. Thus, we hypothesize the following:

Hypothesis 4A: Minority influence is positively related to team performance.

Hypothesis 4B: Minority influence is positively related to team satisfaction.

Method

Participants

Participants were 180 undergraduate students who voluntarily took part in the study. Nine participants did not complete the study or did not follow instructions and were dropped from the analyses, resulting in a total of 171 participants (57 teams) for use in data analysis. Of the participants, 67%

were women, and 77% were White. In addition, 85% were between the ages of 18 and 20 years, and 46% were freshmen.

Task Overview

Participants performed a passenger luggage inspection task as a team of three randomly assigned individuals. A total of 20 x-ray images of suitcases were utilized in the experiment. Some of these images contained weapons. The key decision was whether to search the bag if it was believed to contain a weapon or to clear the bag if it was believed that it contained no weapon. For each image, team members received 10 s to inspect the image individually and then made an individual decision without talking to their teammates. After making the initial individual decision, team members discussed their opinions and then provided a single team decision.   Four blocks of five decision events were performed during the experiment. Immediately after a practice image and every five decisions thereafter, participants completed a survey booklet consisting of relevant measures, including team goal orientation and satisfaction.

Procedure

On arrival participants were randomly assigned to a three-person team. Participants were told that they were to assume the role of an airport security team and were going to process x-ray images of passenger luggage. Participants were given the opportunity to interact with each other before engaging in the performance trials to develop a shared understanding of the team task and a sense of being a member of a team. Following a brief introduction to the experiment, participants were given 3 min to get to know their team members and to provide a nickname for their team. After the teams decided on their nicknames, they were provided with a training manual and asked to study together for 3 min in preparation for a practice trial.

The experimental task was presented on a computer, and the three team members viewed the same computer display. All team member actions and interactions were videotaped over the course of the entire experiment. We projected x-ray images of passenger luggage onto the team computers for each trial, and teams were asked to make and input the team's decision with a mouse connected to the computer. A practice trial was provided to familiarize the team members with the task and to provide an opportunity for team processes to begin functioning before the actual data collection. During the practice trial, participants were given an unlimited amount of time to discuss their decisions, and the experimenter answered any questions regarding the task procedures. Also, participants were informed that they could use the training manual as a reference throughout the experiment. To increase participants' involvement, the experimenter told participants they would be tested on the manual as well as on the task at the end of the experiment.

For each performance trial, an x-ray image of luggage was projected onto the screen. Team members first examined the image and then silently noted individual decisions on their paper about whether the luggage should be cleared or searched and how confident they were about their individual decision. The initial individual decision phase lasted 10 s, and participants were not allowed to see other participants' responses during the period. After the individual decisions, team members freely discussed the luggage to reach their final decision. Team members were encouraged to make their team's final decision collectively and enter their decision in the computer. There was no time limit on

team discussion phase. Immediately after teams entered their final decision for each trial, the computer gave "Correct!" or "Incorrect!" as feedback. Teams earned 10 points for each correct decision and 0 points for each incorrect decision. No penalty was enforced for incorrect decisions. No points were given for the practice trial. After the practice trial, participants completed their first questionnaire. A total of 20 performance trials (four blocks of five trials) were conducted and sessions typically lasted about 1 hr and 20 min.

Measures

Confidence

For each individual decision made during the initial individual decision phase (the first 10 s for each trial), confidence was measured with a 5-point scale measure developed by Henry and Sniezek (1993). The item asked participants to rate their confidence in their search/clear decision according to a scale ranging from extremely confident (5) to not confident at all (1).

Minority confidence

Minority opinion individuals' confidence in their individual decision was assessed for each trial. For example, if Person A decided to search a suitcase and Persons B and C decided to clear a suitcase in the third trial of the second block, we used Person A's confidence rating for that trial to represent minority confidence. In a small number of cases (6% of the total blocks), all members consistently agreed for an entire block of trials, yielding no minority opinion. These cases were treated as missing values for that block of trials.

Team cognitive ability

Past research suggests team cognitive ability is related to team effectiveness (e.g., Bell, 2007; Stewart, 2006). Therefore, we used team cognitive ability as a control variable in all of the analyses. At the beginning of the study, participants reported their ACT or SAT scores, which were then converted to z scores by means of their respective national normative data. The team cognitive ability was then formed for each team by taking the average of the members' scores.

Team learning goal orientation

State team goal orientation was measured with a modified version of goal orientation items developed by Elliot and McGregor (2001). The modification entailed changing the referent from the individual to the team so that it incorporated a set of referent-shift items (Chan, 1998). This measure was administered immediately after the practice trial and prior to Blocks 2, 3, and 4. Three items were used: "Right now, my team wants to learn as much as possible on this task." "Right now, my team hopes to gain a broader and deeper knowledge on this task." "Right now, my team prefers material that really challenges us so we can learn new things on this task." Team members indicated their agreement with each statement on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Coefficient alphas for this scale ranged from .87 (Block 1) to .90 (Block 4). The intraclass correlations (ICC[1]) obtained at Block 1 (.19, $\eta^2 = .48$), Block 2 (.19, $\eta^2 = .47$), Block 3 (.16, $\eta^2 = .45$), and Block 4 (.18, $\eta^2 = .47$) provided justification for aggregating this measure to the team level of analysis by calculating the average value as a meaningful variable.

Team discussion

All team discussions were videotaped, and two coders, the first author and an undergraduate research assistant, rated each individual's contribution to the team discussion on the basis of (a) the number of task relevant utterances an individual made during discussion and (b) the extent to which the individual discussed aspects of the decision task with other members in the team in an interactive and engaged manner. Utterances were coded in terms of the total number of complete phrases that an individual spoke during each block that were task relevant (e.g., asking questions, answering questions, talking about objects in the luggage, and talking about the regulation of harmful objects). Participation ratings were made on a scale of 1 (low) to 3 (high). Each coder independently coded half of the video recordings of the team discussion. To estimate rater agreement and reliability, the two raters independently coded the discussions from a randomly selected set of five teams. On average, the two raters agreed on 97% of the coded utterances made by each individual by each block. The interrater reliability correlation from the two raters was .85 for participating ratings. For each block of trials, team utterance and team participation variables were formed by summing team member utterances and team member participation ratings for each team.

Next, the team utterance and the team participation ratings were standardized and summed to form a team discussion variable. The correlation between the team utterance and team participation variables was significant (average correlation within blocks = .45; correlation across all blocks = .45). Utterance and participation each represent quantity and quality of team discussion: Utterances reflect general levels of task-relevant activity during team discussion and capture the average quantity of the team member's task contributions, whereas participation reflects the average level of team member engagement in coordinated team discussion and reflects the quality of a team member's contributions. It is possible that an individual might speak often during discussion but not do so in a coordinated, engaged, and interactive manner. Therefore, we believe that the combination of the two measures provides a more construct-relevant representation of team participation than either would alone.

Minority influence

The extent to which team members with minority opinions influenced the team decision was calculated as the percentage of times that the minority opinion holder's initial opinion was selected as a team decision instead of the majority opinion holders' initial opinion. When all team members agreed on their initial individual opinion for a trial, then minority influence could not exist for that trial. Therefore, minority influence is based on the subset of occasions where there was disagreement among team members' initial individual decisions. To be concrete, consider a scenario where, for a block of five trials, a team made two decisions aligned with the minority opinion, two decisions aligned with the majority opinion, and one decision based on a unanimous opinion. Minority influence is then calculated for that block of trials by forming the ratio of two (the number of times that minority opinion was selected as the team decision) divided by four (the total number of trials where individuals disagreed on their initial opinions).

Team performance

For each correct decision made, teams were awarded 10 points. Team performance was measured by the number of points that the team earned. A total of 20 trials of luggage screening were carried out; team performance was calculated for each block of five trials.

Team satisfaction

Team satisfaction was measured with a 4-item Team Satisfaction Scale adapted from Cook, Hepworth, Wall, and Warr (1981). To reduce participants' workload, this measure was administrated only three times—at the beginning (after Block 1), in the middle (after Block 3), and at the end (after Block 4) of the experiment. The scale included the following items: "All in all, how satisfied are you with your members in your team?" "All in all, how satisfied are you with your team's performance on the task?" "How satisfied are you the progress you made in the task?" "Considering the effort you put into the task, how satisfied are you with your team's performance?" Teams responded to the items with a 7-point Likert scale ranging from extremely dissatisfied (1) to extremely satisfied (7). The factor analysis supported a one-factor solution. Coefficient alphas for this scale were .88, .88, and .89 at Blocks 1, 3, and 4, respectively. The intraclass correlations (ICC[1]) obtained at Block 1 (.31, $\eta^2 =$ .57), Block 3 (.34, $\eta^2 = .58$), and Block 4 (.24, $\eta^2 = .52$) provided justification for aggregating this measure to the team level of analysis by calculating the average value within teams to represent the team level of satisfaction.

Results

The frequencies of observed decision across all teams are provided in Table 1. Unanimous decisions occurred when all team members agreed on the initial individual decision and then made a team decision consistent with the unanimous individual decisions. Majority decisions occurred when two of the three team members made the same individual decision (majority), and the final team decision was consistent with the majority individual decisions. Finally, minority decisions occurred when two of the three team members made the same individual decision (majority), but the final team decision was consistent with the minority individual decision. On average, teams arrived at unanimous decisions in 62% to 66% of trials in each block (roughly three out of five decisions per block). Teams also arrived at minority decisions in 15% to 20% of trials in each block (roughly one out of five decisions per block).

Table 1

Frequency of Majority, Minority, and Unanimous Decision Across Blocks

Decision	Block 1			Block 2			Block 3			Block 4		
	M	SD	%	M	SD	%	M	SD	%	M	SD	%
Majority[a]	0.70	0.57	14	0.98	0.47	20	0.97	0.46	19	0.93	0.56	19
Minority[b]	0.98	0.67	20	0.76	0.75	15	0.93	0.95	19	0.75	0.69	15
Unanimous[c]	3.32	0.83	66	3.25	0.83	65	3.10	0.83	62	3.31	0.76	66

Note. Each block consisted of five decisions.
[a] When a majority opinion was selected. [b] When a minority opinion was selected. [c] When everyone agreed on a decision.

Table 2 presents descriptive statistics for the study variables. It is interesting to note that team discussion varied more between teams than within teams over time. Performance, on the other hand, varied more within teams over time than between teams. Also, the general pattern of correlations is consistent with our main hypotheses. Between teams, learning goal orientation was related to both team discussion and minority influence, minority confidence was related to discussion, and minority influence, performance, and satisfaction were related to each other. Within teams, minority confidence was related to discussion and minority influence, discussion was related to minority influence, and performance was related to satisfaction. It appears that the relationships among team learning goal orientation, minority confidence, and discussion were primarily between-team

phenomena, whereas the relationships among minority confidence, discussion, minority influence, and performance existed both between and within teams over time.

Table 2
Between- and Within-Team Correlations Among Study Variables

| | | SD | | | | | | | | |
Variable	M	Between team	Within team	1	2	3	4	5	6	7
1. Ability	0.65	0.47	—	1.00	—	—	—	—	—	—
2. Team learning GO	3.39	0.35	0.28	.03	1.00	−.06	.01	−.14	−.14	−.07
3. Minority confidence	3.01	0.47	0.49	.25	.22	1.00	.20	.33	−.03	.03
4. Team discussion	0.12	1.42	0.89	.17	.37	.27	1.00	.33	.07	.10
5. Minority influence[a]	0.42	0.22	0.28	.18	.38	−.02	.48	1.00	.08	.08
6. Performance	28.53	5.57	10.47	.02	−.04	−.23	.28	.37	1.00	.70
7. Satisfaction	5.22	0.70	0.46	−.08	.12	−.21	.33	.35	.60	1.00

Note. The correlations below the diagonal represent between-team correlations that are computed with teams' aggregated scores. The correlations above the diagonal represent the average within-team correlations over time. The values greater than .26 (between team) and .15 (within team) are significant at $\alpha = .05$. GO = goal orientation.
[a] When examining Table 2, care should be taken to distinguish between the notion of minority decisions represented in Table 1 and the notion of minority influence represented in Table 2. The minority decision percentages in Table 1 are based on blocks of five trials. These percentages represent the ratio of the number of times that the minority opinion was selected as the team's decision in the set of five trials. Conversely, the average minority influence percentage in Table 2 represents the average ratio that the minority opinion was selected as the team's decision for only those trials where disagreement occurred across four blocks. In other words, the minority influence percentage in Table 2 represents the number of times that teams adopted the minority opinion holders' initial individual decision over the majority opinion holders' initial individual decision. When all members agreed on their individual decisions, minority or majority influence does not exist for that trial. Therefore, unanimous decisions were not included when calculating minority influence.

Analysis Overview

To evaluate our hypotheses, we used a random intercepts model with an autoregressive error structure. The random intercepts account for nonindependence of observations due to team membership (i.e., ICC[1]) and the autoregressive error structure accounts for nonindependence of errors over time within persons. Our basic model may be represented as follows:

$$Y_{ij} = b_{0[i]} + \{b_1(Ability_i) + b_2(Condition_i)\}$$

$$+ b_3(Time_{ij}) + b_4(X_{ij}) + e_{ij},$$

$$b_{0[i]} \approx N(\beta_0, \sigma_{b0}),$$

where $i = 1\dots$ N; $j = 1\dots$ T; Y_{ij} represents one of the dependent variables in the study (e.g., discussion, minority confidence, team performance, etc…) for the ith team at the jth time period; $b_{0[i]}$ is a random effect reflecting heterogeneity in team intercepts; $Ability_i$ and $Condition_i$ represent the values of the covariates for the ith team; $Time_{ij}$ is a variable corresponding to a value that ranges between 0 and 3 for the ith team measured at the jth time point; X_{ij} represents specific independent variables used to examine the hypothesized relationships(e.g., minority confidence, team learning goal orientation, and minority influence) for the ith team measured at the jth time point; and b_1, b_2, b_3, and b_4 represent fixed effects that capture the common relationships between the model predictors and the Y_{ij}.

The results of these analyses are summarized in Tables 3 and 4, including the parameter estimates (γ) and significance tests for each predictor. γ represents the average or fixed effect estimate and is roughly analogous to conducting a separate regression for each individual or team and averaging the resulting regression weights across individuals or teams. Following Rosenthal and Rubin's (2003) approach, we computed the R^2 value for each fixed effect in Tables 3 and 4 by squaring the $R_{equivalent}$ estimate.

Table 3
Relation of Team Learning Goal Orientations, Minority Confidence, and Team Discussion

Model	γ	SE	Num *df*	Den *df*	F	R^2
DV: Minority confidence						
Ability	0.12	0.10	1	49	1.38	.03
Team learning GO	0.23	0.10	1	171	5.92*	.03
DV: Team discussion						
Ability	0.43	0.36	1	44	1.40	.03
Team learning GO	0.47	0.21	1	174	4.83*	.03
Minority confidence	0.40	0.13	1	155	9.04**	.06

Note. γ = average regression weight; Num = numerator; Den = denominator; DV = dependent variable; GO = goal orientation.
* $p < .05.$ ** $p < .01.$

Table 4
Relation of Discussion on Minority Influence and Effectiveness

Model	γ	SE	Num *df*	Den *df*	F	R^2
DV: Minority influence						
Ability	−0.02	0.06	1	45	0.11	.00
Team discussion	0.09	0.01	1	127	28.06**	.17
DV: Team performance						
Ability	0.04	1.65	1	77	0.00	.00
Minority influence	6.60	2.08	1	204	10.11**	.05
DV: Team satisfaction						
Ability	−0.13	0.18	1	51	0.56	.01
Minority influence	0.38	0.16	1	132	5.91**	.04

Note. γ = average regression weight; Num = numerator; Den = denominator; DV = dependent variable.
** $p < .01.$

Hypothesis Testing

Hypothesis 1

Consistent with Hypothesis 1, minority confidence was positively related to team discussion: $\gamma = 0.40$; $F(1, 155) = 9.04$, $p < .01$. This result indicates that those teams with confident minority opinion members were more likely to engage in team discussion.

Hypothesis 2

Consistent with Hypothesis 2A team learning goal orientation was positively related to team discussion, $\gamma = 0.47$; $F(1, 174) = 4.83$, $p < .05$. Consistent with Hypothesis 2B, team learning goal orientation was positively related to minority opinion members' confidence in their opinions, $\gamma = 0.23$; $F(1, 171) = 5.92$, $p < .05$. This indicates that when teams have a high learning goal orientation, individuals with minority opinions felt greater confidence in their opinion. Extending the findings from Hypotheses 1, this result suggests that team learning goal orientation facilitates minority confidence in their opinions and team discussion.

Hypothesis 3

Consistent with Hypothesis 3, team discussion was positively related to minority opinion member influence, $\gamma = 0.09$; $F(1, 127) = 28.06$, $p < .01$. This indicates that, as teams engaged in active discussions, they were more likely to adopt the minority opinion as their team decision. Specifically, an increase in one unit of the team discussion rating led to a 10% increase in the likelihood of the minority opinion being selected as the team decision. Although we tested the hypotheses with the combined discussion variables, in the Appendix we also present the results based on the separated team discussion constituents.

Hypothesis 4

Consistent with Hypothesis 4A, minority opinion member influence was positively related to team performance, $\gamma = 6.60$; $F(1, 204) = 10.11$, $p < .01$, indicating that greater minority influence relates to better team performance. Consistent with Hypothesis 4B, minority influence was positively related to team satisfaction, $\gamma = 0.38$; $F(1, 132) = 5.91$, $p < .01$. This indicates that greater minority influence relates to greater satisfaction with the team.

Testing of the mediation model

To evaluate the proposed model, we examined the significance of each hypothesized indirect relationships with the z' method, as recommended by MacKinnon, Lockwood, Hoffman, West, and Sheets (2002). Results support the mediated relationships in our model. Specifically, the mediated effects of team discussion were significant: team discussion mediated the relationship between team goal orientation and minority influence, $(z') = 2.03$, $p < .01$, and team discussion mediated the relationship between minority confidence and minority influence, $(z') = 2.61$, $p < .01$. Minority confidence mediated the relationship between team goal orientation and discussion, $(z') = 1.88$, $p < .01$. Finally, the mediation effects of minority influence were significant, such that the minority influence mediated the relationship between discussion and performance, $(z') = 2.71$, $p < .01$, and between discussion and satisfaction, $(z') = 2.20$, $p < .01$. Thus, we found support for the model that minority confidence, discussion, and minority influence play mediating roles between learning goal orientation and team effectiveness.

Discussion

This research is the first to approach the issue of minority influence in decision-making teams from a multilevel perspective by examining how team learning goal orientation relates to the processes of minority influence that, in turn, relate to team effectiveness. Our results suggest that team learning goal orientation facilitates minority influence through increased team discussion. Specifically, when team members viewed their goal as learning and mastering the task, having different opinions and seeking diverse opinions appeared to be encouraged in a manner that promoted higher confidence among minority opinion holders. Likewise, the members of teams that had a high learning goal orientation were more involved in active team discussion.

Consistent with previous findings, the current study showed a relationship between team discussion with minority influence and team decision quality. Findings from the current study also suggest that team discussion relates to minority influence and team satisfaction. Thus, the current findings

replicate and extend previous studies on minority influence by examining team discussion as a precursor of minority influence on team decisions and team effectiveness.

Limitations

Despite these contributions, several limitations of this research should be kept in mind when interpreting these findings. All teams in the current study were newly formed and worked on a novel task of screening the luggage. It remains unclear whether these findings will generalize to different organizational contexts in which team members are more experienced with each other and the task and are aware of each other's different sources of expertise.

The effect sizes found in the present research are not large. Despite the small effect sizes, the widespread use of decision-making teams and the importance of the decisions being made by the teams suggest that the present results can have substantial practical implications (e.g., Abelson, 1985; Cortina & Landis, 2008). The security screening task used in this research is a good example of when small team decision errors can result in disastrous outcomes.

As is generally the case for nonexperimental investigations, the causal mechanism underlying our observed results remains ambiguous, particularly with respect to the relative magnitude of the direct and indirect effect of team learning goal orientation on minority confidence. More advanced analytic techniques (e.g., multivariate time series analysis) with direct manipulation of team learning goal orientation that could be used to model the underlying dynamics require far more intensive longitudinal data than we were able to collect in the present research (Stone-Romero & Rosopa, 2008).

Although the current study focuses on mainly positive implications of minority influence, such as increased problem-solving abilities, it is important to note that minority influence can also imply negative group processes. For example, minority opinions can cause conflict among group members and yield suboptimal outcomes (e.g., Lott & Lott, 1965; Ten Velden, Beersma, & De Dreu, 2007). Future studies should examine factors that distinguish the positive impacts of minority influence from the negative impacts.

Implications

The current study suggests emphasizing team learning goal orientation as a viable decision-making intervention for organizations. Previously, selecting a member in the team to take the role of dissenter, or the devil's advocate, during team discussions was suggested as a technique to increase minority influence and team decision quality by inducing cognitive conflicts of team members (Schweiger, Sandberg, & Rechner, 1989; Schwenk, 1990). However, this technique can cause stress for team members, especially those who are selected as the devil's advocate, and can create unnecessary friction among team members, which may decrease their satisfaction (Nemeth & Staw, 1989; Van Dyne & Saavedra, 1996). The results of this study suggest that the emphasis of learning goals can increase team decision quality without sacrificing members' satisfaction.

Many different characteristics of both individuals and teams affect minority influence in decision-making teams; future studies need to consider the diverse characteristics of both individuals and teams to broaden the understanding of minority influence processes. For example, a team-level climate on

procedural justice may influence the extent to which team members respect other members' opinions and unique suggestions (Van Prooijen, Karremans, & Van Beest, 2006). Further research is needed to identify other individual and team characteristics that improve team decision-making processes and outcomes.

Footnotes

1 The task used in this research is a modified version of a luggage-screening task developed by Daniel R. Ilgen and his students with stimulus materials from the Transportation Security Administration.

2 The data were collected as a part of a larger study that assessed two different decision-making structures. In one condition, individuals made a collective decision, and anyone could enter the decision into the computer. In the other condition, individuals made a collective decision as a team, but a single team member was responsible for entering the team decision into the computer. This distinction is not relevant to the current focus; therefore, the difference between the conditions was controlled for with a dummy coded variable in all reported analyses.

References

Abelson, R. P. (1985). A variance explanation paradox: When a little is a lot. Psychological Bulletin, 97, 129– 133.

Baron, R. S., & Kerr, N. L. (2003). Group process, group decision, group action. Buckingham, PA: Open University Press.

Bell, S. T. (2007). Deep-level composition variables as predictors of team performance: A meta-analysis. Journal of Applied Psychology, 92, 595– 615.

Burden of Enron's collapse on Skilling as sentencing approaches. (2006, October22). USA Today. Retrieved from http://www.usatoday.com/money/industries/energy/2006-10-22-skilling-sentence_x.htm

Campbell, J., & Stasser, G. (2006). The influence of time and task demonstrability on decision-making in computer-mediated and face-to-face groups. Small Group Research, 37, 271– 294.

Cannon-Bowers, J. A., Tannenbaum, S. I., Salas, E., & Volpe, C. E. (1995). Defining competencies and establishing team training requirements. In R. A.Guzzo & E.Salas (Eds.), Team effectiveness and decision making in organizations (pp. 333– 381). San Francisco, CA: Jossey-Bass.

Chan, D. (1998). Functional relations among cohesions in the same content domain at different levels of analysis: A typology of composition models. Journal of Applied Psychology, 83, 234– 246.

Cook, J. D., Hepworth, S. J., Wall, T. D., & Warr, P. B. (1981). The experience of work: A compendium of 249 measures and their use. London, England: Academic Press.

Cortina, J. M., & Landis, R. S. (2008). When small effect sizes tell a big story, and when large effect sizes don't. In C. E.Lance & R. J.Vandenberg (Eds.), Statistical and methodological myths and urban legend: Doctrine, verity and fable in the organizational and social sciences (pp. 287– 308). New York, NY: Routledge.

De Dreu, C. K. W. (2007). Minority dissent, attitude change, and group performance. In A. R.Pratkanis (Ed.), The science of social influence: Advances and future progress (pp. 247– 270). New York, NY: Psychology Press.

De Dreu, C. K. W., & Beersma, B. (2001). Minority dissent in organizational teams: Implications for group innovation. In C. K. W.De Dreu & N. K.De Vries (Eds.), Group consensus and minority influence: Implications for innovation (pp. 258– 283). London, England: Blackwell.

De Dreu, C. K. W., & De Vries, N. K. (1996). Differential processing and attitude change following majority versus minority arguments. British Journal of Social Psychology, 35, 77– 90.

De Dreu, C. K. W., & West, M. A. (2001). Minority dissent and team innovation: The importance of participation in decision making. Journal of Applied Psychology, 86, 1191– 1201.

DeShon, R. P., Kozlowski, S. W. J., Schmidt, A. M., Milner, K. R., & Wiechmann, D. (2004). A multiple-goal, multilevel model of feedback effects on the regulation of individual and team performance. Journal of Applied Psychology, 89, 1035– 1056.

Drake, B. H., & Mitchell, T. R. (1977). The effects of vertical and horizontal power on individual motivation and satisfaction. Academy of Management Journal, 20, 573– 591.

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. Administrative Science Quarterly, 44, 350– 383.

Edmondson, A. (2002). The local and variegated nature of learning in organizations: A group-level perspective. Organization Science, 13, 128– 146.

Elliot, A. J., & McGregor, H. A. (2001). A 2 × 2 achievement goal framework. Journal of Personality and Social Psychology, 80, 501– 519.

Forsyth, D. R. (2006). Group dynamics (4th ed.). Belmont, CA: Thomson.

Hackman, J. R. (1988). The design of work teams. In J.Lorsch (Ed.), Handbook of organizational behavior (pp. 315– 342). Englewood cliffs, NJ: Prentice-Hall.

Henry, R. A., & Sniezek, J. A. (1993). Situational factors affecting judgments of future performance. Organizational Behavior and Human Decision Processes, 54, 104– 132.

Hinz, V. B. (1990). Cognitive and consensus processes in group recognition memory performance. Journal of Personality and Social Psychology, 59, 705– 718.

Ilgen, D. R., Hollenbeck, J. R., Johnson, M., & Jundt, D. (2005). Teams in organizations: From I-P-O models to IMOI models. Annual Review of Psychology, 56, 517– 544.

Ilgen, D. R., Major, D. A., Hollenbeck, J. R., & Sego, D. J. (1995). Raising an individual decision-making model to the team level: A new research model and paradigm. In R.Guzzo & E.Salas (Eds.), Team decision making in organizations (pp. 113– 148). San Francisco, CA: Jossey-Bass.

Janis, I. L. (1982). Groupthink: Psychological studies of policy decisions and fiascoes (2nd ed.). New York, NY: Houghton Mifflin.

Kerr, N. L. (2001). Is it what one says or how one says it? Style vs substance from an SDS Perspective. In C. K. W.De Dreu & N. K.De Vries (Eds.), Group consensus and minority influence: Implications for innovation (pp. 201– 228). Oxford, England: Blackwell.

Kerr, N. L., & Tindale, R. S. (2004). Small group decision making and performance. Annual Review of Psychology, 55, 623– 656.

Larson, J. R., Foster-Fishman, P. G., & Keys, C. B. (1994). Discussion of shared and unshared information in decision-making groups. Journal of Personality and Social Psychology, 67, 446– 461.

LePine, J. A. (2005). Adaptation of teams in response to unforeseen change: Effects of goal difficulty and team composition in terms of cognitive ability and goal orientation. Journal of Applied Psychology, 90, 1153– 1167.

Lott, A. J., & Lott, B. E. (1965). Group cohesiveness as interpersonal attraction: A review of relationships with antecedent and consequence variables. Psychological Bulletin, 64, 259– 309.

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. Psychological Methods, 7, 83– 104.

Martin, R., & Hewstone, M. (2001). Conformity and independence in groups: Majorities and minorities. In M. A.Hogg & R. S.Tindale (Eds.), Handbook of social psychology: Group processes (pp. 209– 234). Malden, MA: Blackwell.

Miller, K. I., & Monge, P. R. (1986). Participation, satisfaction, and productivity: A meta analytic review. Academy of Management Journal, 29, 727– 753.

Morrison, E. W., & Milliken, F. J. (2000). Organizational silence: A barrier to change and development in a pluralistic world. Academy of Management Review, 25, 706– 725.

Moscovici, S. (1985). Social influence and conformity. In G.Lindzey & E.Aaronson (Eds.), The handbook of social psychology (pp. 347– 412). New York, NY: Random House.

Nemeth, C., & Chiles, C. (1988). Modeling courage: The role of dissent in fostering independence. European Journal of Social Psychology, 18, 275– 280.

Nemeth, C., & Kwan, J. (1987). Minority influence, divergent thinking, and detection of correct solutions. Journal of Applied Social Psychology, 17, 788– 799.

Nemeth, C., & Staw, B. M. (1989). The tradeoffs of control and innovation in groups and organizations. In L.Berkowitz (Ed.), Advances in experimental social psychology (Vol. 22, pp. 175– 210). New York, NY: Academic Press.

Nemeth, C., & Wachtler, J. (1974). Creating the perceptions of consistency and confidence: A necessary condition for minority influence. Sociometry, 37, 529– 540.

Papaioannou, A., & Kouli, O. (1999). The effect of task structure, perceived motivational climate and goal orientations on students' intrinsic motivation and anxiety. Journal of Applied Sport Psychology, 11, 51– 71.

Parker, L. E. (1993). When to fix it and when to leave: The relationship among perceived control, self-efficacy, dissent and exit. Journal of Applied Psychology, 78, 949– 959.

Rosenthal, R., & Rubin, D. B. (2003). r equivalent: A simple effect size indicator . Psychological Methods, 8, 492– 496.

Schulz-Hardt, S., Brodbeck, F. C., Mojzisch, A., Kerschreiter, R., & Frey, D. (2006). Group decision making in hidden profile situations: Dissent as a facilitator for decision quality. Journal of Personality and Social Psychology, 91, 1080– 1093.

Schweiger, D. M., Sandberg, W. R., & Rechner, P. L. (1989). Experiential effects of dialectical inquiry, devil's advocacy, and consensus approaches to strategic decision making. Academy of Management Journal, 32, 745– 772.

Schwenk, C. R. (1990). Effects of devil's advocacy and dialectical inquiry on decision making: A meta-analysis. Organizational Behavior and Human Decision Processes, 47, 161– 176.

Stasser, G., & Titus, W. (1985). Pooling of unshared information in group decision making: Biased information sampling during discussion. Journal of Personality and Social Psychology, 48, 1467– 1478.

Stewart, G. L. (2006). A meta-analytic review of relationships between team design features and team performance, Journal of Management, 52, 29– 54.

Stone-Romero, E. F., & Rosopa, P. J. (2008). The relative validity of inferences about mediation as a function of research design characteristics. Organizational Research Methods, 11, 326– 352.

Ten Velden, F. S., Beersma, B., & De Dreu, C. K. W. (2007). Majority and minority influence in group negotiation: The moderating influence of social motivation and decision rules. Journal of Applied Psychology, 92, 259– 268.

Van Dyne, L., & Saavedra, R. (1996). A naturalistic minority influence experiment: Effects on divergent thinking, conflict and originality in work-groups. British Journal of Social Psychology, 35, 151– 168.

Van Prooijen, J. W., Karremans, J. C., & Van Beest, I. (2006). Procedural justice and the hedonic principle: How approach versus avoidance motivation influences the psychology of voice. Journal of Personality and Social Psychology, 91, 686– 697.

Zimbardo, P., Butler, L., & Wolfe, V. (2003). Cooperative college examinations: More gain, less pain when students share information and grades. Journal of Experimental Education, 71, 101– 126.

APPENDIX

APPENDIX A: Alternative Model With Separate Dimensions of Team Discussion
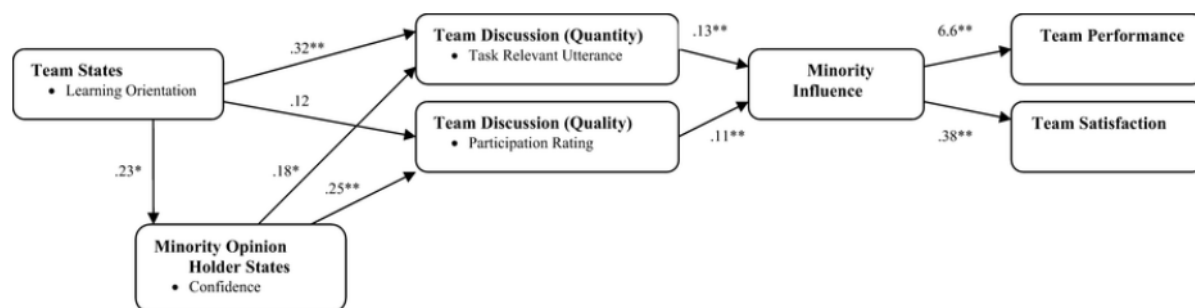

Figure A1. This figure presents the pattern of results when the constituents of team discussion (i.e., task relevant utterances and participation ratings) are kept distinct. The general patterns of relationships were consistent with our hypotheses. Both task relevant utterances and participation ratings showed significant relationships with minority influence—this suggests the validity of the two discussion dimensions on predicting minority influence. Whereas task-relevant utterance was significantly related to team learning goal orientation and minority confidence, participation rating was significantly related only to minority confidence. This indicates that when a team has a high learning goal orientation, they are more likely to engage in a greater amount of task-relevant discussion. However, they are not necessarily participating in their discussion in a more engaging manner. * $p < .05$. ** $p < .01$.
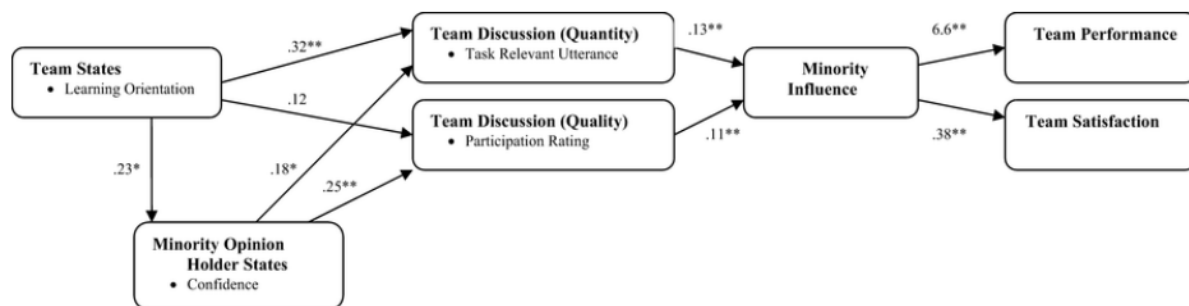

Figure A1. This figure presents the pattern of results when the constituents of team discussion (i.e., task relevant utterances and participation ratings) are kept distinct. The general patterns of relationships were consistent with our hypotheses. Both task relevant utterances and participation ratings showed significant relationships with minority influence—this suggests the validity of the two discussion dimensions on predicting minority influence. Whereas task-relevant utterance was significantly related to team learning goal orientation and minority confidence, participation rating was significantly related only to minority confidence. This indicates that when a team has a high learning goal orientation, they are more likely to engage in a greater amount of task-relevant discussion. However, they are not necessarily participating in their discussion in a more engaging manner. * $p < .05$. ** $p < .01$.