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Shared cognition in top management teams: implications for new venture performance

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Summary

This paper presents a study of two samples of new venture top management teams from the *inc. 500*. The research poses that shared strategic cognition is the outcome of group processes that occur during the development of strategy. Shared cognition in top management teams (TMTs) is the extent to which those mental models about strategy are shared. A theoretical frame is developed that links shared strategic cognition to group process and new venture performance. The results indicate that the group processes leading to the development of shared strategic cognition are more important than the outcome of shared strategic cognition in terms of predicting organizational performance. Copyright © 2001 John Wiley & Sons, Ltd.

Introduction

Shared cognition, or thinking at the group level, has seen a rebirth of research interest in recent years. Cannon-Bowers *et al's* (1993) and Klimoski and Mohammed's (1994) seminal works on shared cognition were the culmination of this rebirth. This research has two objectives in advancing research on shared cognition. First, we examine shared cognition from two perspectives: shared cognition as a part of group process during its creation; and shared cognition as an outcome. Building on the work of Bettenhausen and Murningham (1985) and Jehn (1997) we examine cognitive and affective conflict in TMTs as the group processes most directly related to shared cognition. Building on the work of Walsh (1995) and Knight *et al.* (1999), we examine the overlap of TMT members' strategic cognitive maps as the cognitive event of shared strategic cognition in TMTs.

Second, it is the objective of this research to integrate shared cognition into models of group decision-making, group process, and firm performance in a specific organizational context, and new ventures. While we expect some generalizable outcomes from the study, our research is context specific. However, this study also contributes to a large stream of research on new venture performance (e.g., Ensley and Pearce, 2000 – Paper presented at the 20th Entrepreneurship Research Conference, Massachusetts; Cooper *et al.*, 1994; McDougall, 1987 – Unpublished Doctoral Dissertation; Sandberg,

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1986) and we believe that shared strategic cognition could be a major explanatory factor (West and Meyer, 1998) in this context.

To achieve these objectives we will present a two sample study of 70 and 88 new venture TMTs. The first sample is used to explore the link between group process, shared strategic cognition, and new venture performance. The second sample adds group cohesion as an antecedent in an effort to improve the explanatory power of the model. Group cohesion has been shown previously to have a direct effect on new venture and entrepreneurial firm performance (Amason and Sapienza, 1997; Ensley *et al.*, in press).

Cognitive conflict is the process of thinking about multiple ideas (Amason and Schweiger, 1994; Jehn, 1995). At the group level, cognitive conflict is sharing and developing those ideas through cognitive tug and pull. On the other hand, affective conflict is more emotive in nature and has been shown to be detrimental to the development of strategic consensus (Knight *et al.*, 1999). Conflict is a process that teams go through to make decisions, take action, and create cognitive schema. We argue that conflict, as it is defined here, is the process of creating (or detracting from) the overlap in strategic cognitive maps and therefore a key group process in the development of shared strategic cognition.

Strategic consensus has traditionally been defined as understanding and agreeing on strategy (Floyd and Wooldridge, 1992; Wooldridge and Floyd, 1989). Wooldridge and Floyd called true consensus a 'collective heart and mind regarding fundamental organizational priorities' (1989: 142). Knight *et al.* (1999) theoretically developed the concept of strategic consensus from literature on mental maps. They argued that greater strategic consensus was achieved when there is greater overlap or agreement between top managers regarding the strategy of the firm. Building on these previous approaches, we define shared strategic cognition as the extent to which strategic mental models held in the hearts and minds of the TMT members overlap or agree.

The process of developing such shared understanding is the outcome of discussions of strategic decisions and the resulting cognitive conflict (Amason, 1996; Priem and Price, 1991). Simply, the action of cognitive discourse over strategic decisions is the process of creating shared strategic cognition. It is through these discussions that strategic ideas are explored, agreed to, and understood.

A separate component of conflict is affective conflict (Jehn, 1995, 1997; Jehn *et al.*, 1999). Therefore, we include affective conflict arising from these strategic discussions as a part of the model. Affective conflict has been found to be closely related to cognitive conflict such that models of group decision making are somewhat incomplete without both of them present (Jehn, 1995, 1997).

Differentiating conflict from other forms of group process

Differences do exist between conflict and other types of group process. Conflict is an active process by which TMTs illuminate issues that exist within the firm and between team members. Conflict deals with the task of the team much more than other group dynamics variables such as cohesion. While conflict can rise or fall at an erratic pace (Jehn, 1995, 1997), cohesion levels tend to remain more constant over time (Bollen and Hoyle, 1990). Conflict is concerned with the discourse of making decisions while other group dynamics variables tend to be a more generalized state of the group (Hogg, 1987). Therefore, it is our objective to understand how the generalized state of cohesion also effects this discourse and understand how this discourse shapes the strategic mental models and therefore firm performance.

Integration and Hypotheses

Linking group processes with the extent to which shared cognition exists and understanding the performance effects from those linkages is central to this research. Our theoretical model suggests that

cohesion impacts affective and cognitive conflict, that conflict impacts shared strategic cognition and shared strategic cognition impacts firm performance. Below, we develop the logic for each of the linkages in the model.

Cohesion and cognitive conflict

The mental state of TMTs is a critical predictor of TMT behavior (Amason, 1996). One of the most important of these group level mental states is group cohesion. Cohesion is viewed by many as a strong predictor of group behavior (Goodman *et al.*, 1987; Barnard *et al.*, 1993) and denotes a state of social relationship among a team defined as 'the degree to which members of the group are attracted to each other' (Shaw, 1981, p. 213). The members of cohesive teams exhibit higher levels of affinity and trust for one another as well as higher levels of satisfaction with, and affective attraction to, the group as a whole (O'Reilly *et al.*, 1989).

It is clear however, that the findings surrounding cohesion are clearly not all positive. Many of the studies that examine the relationship between cohesion and group effectiveness find conflicting results (Gully *et al.*, 1995; Evans and Dion, 1991). Mullen and Copper, in a meta-analysis of 49 studies examining the relationship of cohesion and performance, found 'the cohesiveness-performance effect was significant' (1994, p. 210). However, the Mullen and Copper study is clear that group context is a potentially important moderator of the link between cohesion and performance. These three meta-analyses report effect sizes of -0.23 to 0.79 for the cohesion-performance relationship. Therefore, there is a danger in highly cohesive executive teams of Janis' (1982) idea of groupthink. It appears that the personal attraction component of cohesion is the key determinant of such negative effects (Mullen *et al.*, 1994). However, the general finding in most studies is that cohesion facilitates group interaction and performance (Dion and Evans, 1992; Gully *et al.*, 1995).

We believe that cohesiveness within new venture TMTs is especially important because of the complex and ambiguous nature of the team's task. Research has shown that teams that perform well under uncertain and ambiguous conditions are highly coordinated and flexible (Eisenhardt, 1989; Eisenhardt and Bourgeois, 1988). As Smith *et al.* explain, 'top management teams that work well together react faster, are more flexible, use superior problem solving techniques, and are more productive and efficient than less integrative teams' and 'operate as efficient clans, not needing to expend extra energy or resources on group maintenance' (1994, p. 432). Cohesive teams are more likely to share tacit understandings and values and so move quickly in the consideration of multiple issues without having to revisit underlying assumptions and goals. Similarly, the members of cohesive teams are less likely to engage in opportunistic and self-serving behaviors which would undermine cooperation and norms of mutuality. All of this suggests that cohesive teams are likely to produce the synergy necessary for superior group performance while also experiencing relatively few process losses (Steiner, 1972; Katz and Kahn, 1978; Jehn, 1994; Nemeth and Staw, 1989).

The presence of such norms is essential for the development of cognitive conflict. Recall, the ambiguity of managing a new venture provides abundant opportunity for divergent perspectives and conflicting ideas (Autio *et al.*, 2000; Kimberly, 1979). It is our argument that such ambiguity will not allow the team to seep into the peril of groupthink.

The true ambiguity may lie in the direction of the cohesion-conflict relationship, as it could be reciprocal. However, in this study we are examining conflict in the current strategic decision making sessions (See Amason (1996) for a discussion of this method). Cohesion existed before these sessions started and therefore cohesion has to be the antecedent variable. Ensley *et al.* (in press) findings support this ordering in a causal model of TMTs group process. Thus, because cohesive teams in this type of setting are likely to be more open to discussion and dissent, we expect them to experience more

cognitive conflict in current and future strategic decision making processes, which leads to our first hypothesis:

Hypothesis 1: In new venture TMTs, cohesion will be positively related to the level of cognitive conflict experienced during strategic decision making.

Cohesion and affective conflict

The sense of familiarity and tolerance that facilitates cognitive conflict should mitigate affective conflict. Indeed, many affective conflicts arise as cognitive conflicts are misinterpreted and inflamed (Brehmer, 1976; Pelled, 1996). Suspicion and mistrust can undermine cognitive conflict as they cause substantive issues to be mistaken for personal attacks (Baron, 1988). Dissimilar values and perspectives can lead to misinterpretation of reasonable criticisms, resulting in disproportionate responses.

Cohesion may serve as a strong centripetal force binding a team together in the presence of a centrifugal force like conflict (Hambrick, 1994). As team members disagree, the chances that misunderstanding and misinterpretation will inadvertently trigger an affective response increases. Cohesion raises the threshold for such responses. The members of cohesive teams disagree but are less apt to take their disagreements personally. The members of cohesive teams criticize but are less apt to view that criticism with suspicion. Cohesive teams then should be more effective in embracing conflict than teams that are less cohesive because their tendency for cognitive conflict to trigger affective conflict should be substantially reduced (Ensley *et al.*, in press). As such, we offer our second hypothesis:

Hypothesis 2: In new venture TMTs, cohesion will be negatively related to the level of affective conflict experienced during strategic decision making.

The relationship between cognitive and affective conflict

Recent research has shown conflict to be multidimensional (Pinkley, 1990; Jehn, 1994, 1995). Moreover, most research has found a substantial link between cognitive and affective conflict (Amason, 1996; Jehn, 1995, 1997). The mutation of conflict from its cognitive to its affective dimension has been linked to such things as value dissimilarity (Jehn, 1994) and the absence of open and mutual interaction norms (Amason and Sapienza, 1997). Team members whose values differ at a fundamental level are more likely to have different belief structures, understandings, and priorities. As such, they may be less understanding and tolerant of disagreement and dissent. In contrast, cohesive teams are likely to be less distrustful and suspicious and so may be more tolerant of disagreement and dissent. Indeed, a sense of belonging and familiarity should promote mutual and trusting relationships, which should lead to more open and cooperative group norms. Research has shown that competitive norms can promote suspicion and mistrust and so reduce open and mutual interaction norms (Tjosvold and Deemer, 1980). Therefore we offer our third hypothesis:

Hypothesis 3: In new venture TMTs, greater cognitive conflict will lead to higher levels of affective conflict during strategic decision making.

Cognitive conflict and shared strategic cognition

Recent studies which explore the relationship between group processes, like cognitive and affective conflict, and strategic cognition have shown that cognitive conflict improves the clarity of the group's

strategic mental map (see Klimoski and Mohammed, 1994). Cannon-Bowers *et al.* (1993), for example, state that 'providing expectations about the task and team performance is the most important function of shared mental models' (p. 234). Cognitive conflict is essential to the development of the understanding of expectations about the task at hand. Amason (1996) found direct evidence that a relationship exists between cognitive conflict and consensual decision making activities. TMTs that used greater levels of cognitive conflict reached a greater understanding of the strategic decision and why the particular strategic alternative was chosen. Schweiger and colleagues (1986, 1989) found that cognitive conflict encouraged a more complete evaluation of the decision-making alternatives.

This clearer understanding of available strategic alternatives should improve the level of shared cognition. If we take the Wooldridge and Floyd's (1989) perspective on strategic consensus as the collective heart and mind of the team then understanding other team member's strategic mental models is important to that development. Therefore, cognitive conflict is essentially the actual process of creating shared cognition at the group level. Based on these findings we offer our fourth hypothesis:

Hypothesis 4: Cognitive conflict in new venture TMTs leads to the development of greater levels of shared strategic cognition.

Affective conflict and shared strategic cognition

If cognitive interactions of new venture TMT members are positive then personally charged interactions are intuitively negative events. Affective conflict is focused on personal incompatibility and therefore has only dysfunctional effects (Amason and Schweiger, 1994; Jehn, 1995; Priem and Price, 1991). Affective conflict erodes strategic consensus and destroys agreement on the firm's overall strategic direction (Knight *et al.*, 1999). When the conflict becomes personal in nature the result could be a general political counter effort that erodes strategic consensus. This erosion of affect between team members also impedes the team's progress toward the creation of a shared strategic mental model. Affective conflict could rise to such levels that there is pure cynicism over whether strategy can be agreed on and implemented at all.

Eisenhardt and Bourgeois (1988) argue that such activity can be the source of the development of political coalitions. One could argue that political coalitions are simply a way of saying that the collective mind and heart that Wooldridge and Floyd (1989) talked about does not exist. They argue that non-consensus seeking strategic decision making models simply do not work and that behaviors that increase such activity are counterproductive. These findings lead us to the conclusion that affective conflict lowers shared strategic cognition. Therefore we offer our fifth hypothesis:

Hypothesis 5: Affective conflict in new venture TMTs is negatively related to shared strategic cognition.

Conflict levels, shared strategic cognition, and firm performance

The importance of shared mental models to organizational performance has been of considerable debate (West and Meyer, 1998). However, most strategy scholars argue that strategic consensus has positive performance effects (Floyd and Wooldridge, 1992; Wooldridge and Floyd, 1989). This, however, does not explain fully the potential performance effects of shared cognition on new ventures. It does not explain, for example, the extent to which group processes influence firm performance. Cognitive conflict, has been found to have some positive effects on both group and firm performance and affective conflict has generally been found to have the alternate effect (Amason, 1996; Jehn, 1995,

1997). While we argue that strategic consensus can range from two ends of a continuum with group-think symptoms on one end and anarchy on the other, we argue that shared cognition about strategic ideas and concepts is generally a good thing (Hambrick, 1981). Based on these theoretical developments we offer our final group of hypotheses:

Hypothesis 6a: The relationship between shared strategic cognition and organizational performance is positive.

Hypothesis 6b: The relationship between cognitive conflict and organizational performance is positive.

Hypothesis 6c: The relationship between affective conflict and organizational performance is negative.

Method

To test our hypotheses we gathered data from the TMTs of 88 and 70 new ventures, all of which were members of the 1994 and 1995 *inc. 500*, respectively. The names of the TMT members and contact information were obtained from the Dun & Bradstreet Market Identifiers database. All of the firms in the *inc. 500* are privately held and are not required to report information on themselves in any standardized way. Thus, we chose to define the members of the top management team as being those individuals who met at least two of three conditions. They either were founders (Kamm *et al.*, 1990); currently held an equity stake of at least 10 per cent (Kamm *et al.*, 1990; Carland *et al.*, 1984); or were identified in some way as being actively involved in strategic decision making (Cachon, 1990; Stewart *et al.*, 1999). In addition, Roure and Madique (1986) argued that the new venture TMT consisted of those people identified as the CEO, President, and critical line or staff functions. In using the Dun & Bradstreet Market Identifiers Database to identify *inc. 500* executives, only executives identified as either the CEO, President, or critical staff functions, such as Vice-President of Marketing, were utilized in the sample.

In an effort to cross-check this proposed definitional framework, the CEO or President of each of the companies in the 1994 and 1995 *inc. 500* lists, were telephoned and asked to identify those involved in new venture TMT strategic decision making activities. All of the team members identified by our criteria were identified by the CEOs/Presidents as members of the firm's core strategic decision making group.

Firms that had been merged, acquired, gone out of business or for which the top management team could not be identified were excluded from both samples. As such, each officer of the 1994 and 1995 *inc. 500* received a personalized letter and individually numbered questionnaire. A total of 1203 questionnaires for the 1994 sample and 1156 for 1995 sample were mailed. A total of 322, for the 1994 sample, and 316, for the 1995 sample, responses were returned. However, after eliminating firms that were no longer in existence, firms from whom we failed to receive multiple responses, managers who were not active participants in the firm's TMT, and managers who provided incomplete responses, our sample declined to 196 managers in 88 firms for the 1994 sample, a usable response rate of 17.6 per cent, and 192 managers from 70 firms in the 1995 sample, a useable response rate of 18.0 per cent. The average number of respondents per team was 2.4 persons for 1994 and 2.74 for 1995. The team level response rate was greater than 50 per cent in all teams or the team was not included in the analysis. This is an acceptable level of response given the findings of Moeller *et al.* (1988). Finally, 30 of the non-respondent firms were sampled to assess non-response bias in each sample. *T*-tests on five

variables including revenues, firm age, team size, revenue growth rate, and profit level were conducted. All of these tests yielded non-significant probability values ranging from 0.21–0.84. There was no evidence of non-response bias and we concluded that such bias was minimal in either sample.

The characteristics of both samples are reported respectively. The 1994 sample first and the 1995 second. Of the members of both samples, approximately 90 per cent were male and the average age was 36.7 and 38.4 years respectively. Ninety per cent and 80 per cent were founders and 94 per cent and 86 per cent held at least 10 per cent of the equity in their firms. Ninety-five per cent and 98 per cent reported themselves to be key strategic decision makers. Nearly 90 per cent of both samples considered themselves to be entrepreneurs and only 40 per cent of either sample had been involved in a new venture previously.

Over the past five years, these 88 and 70 firms grew at an annual average of 1664 per cent and 2084 per cent respectively. The samples ranged in revenue growth rate from a low of 524 per cent to a high of 11385 per cent and a low 516 per cent to a high of 25302 per cent, respectively. They represented a total of 55 and 52 different industries, respectively. The average firm age was 8.6 years and 7.75 years, with the range between 7 and 16 and 5 to 11 years, respectively. Firm size ranged from median employee sizes of 49.5 for the 1994 sample and 95 for the 1995 sample. The median revenue figure was U.S. \$6686 500 and \$14 500 000, respectively.

Measures

All measures, with the exception of revenue and growth rate, were collected with a 5-point response format labelled as follows: SA = strongly agree, A = agree, N = no opinion, D = disagree, and SD = strongly disagree. Table 1 provides the correlation matrices and descriptive statistics of our study variables.

For both cohesion and conflict, the mean of the individual responses within each team was used as the team-level variable. However, for both cohesion and conflict, the level of within-team agreement was assessed before the individual measures were combined to form the team-level variables (Amason,

Table 1. Correlation matrices

	Mean	SD	1	2	3	4	5	6	7
<i>1994 inc. 500</i>									
1. Growth	1177	133							
2. Sales	14244	1682	0.42*						
3. Profit	0.95	7.99	0.07	-0.06					
4. Affective conflict	2.32	0.18	0.01	-0.05	-0.05				
5. Cognitive conflict	1.61	0.13	-0.05	-0.10	-0.04	0.75*			
6. Strategic cognition	0.41	0.07	0.04	0.13 [†]	-0.10	0.09	0.06		
<i>1995 inc. 500</i>									
1. Growth	2416	3483							
2. Sales	50619	84158	0.29*						
3. Profit	3.38	1.40	-0.04	-0.20*					
4. Cognitive conflict	2.78	0.47	0.08	0.27*	0.13				
5. Affective conflict	2.37	0.58	-0.04	-0.10	0.02	0.56 [†]			
6. Belonging	4.48	0.51	-0.30*	-0.06	0.17	-0.23 [†]	-0.42 [†]		
7. Morale	4.07	0.84	0.01	0.10	0.17	-0.12	-0.24 [†]	0.53 [†]	
8. Strategic cognition	0.41	0.08	0.27*	0.21 [‡]	0.01	-0.07	-0.09	-0.07	-0.02

* $p < 0.01$; [†] $p < 0.05$; [‡] $p < 0.10$.



1996; Smith *et al.*, 1994). We utilized two measures of within team agreement. First, we used the $r_{WG(J)}$ approach developed by James *et al.* (1993) who noted that it was really a measure of within team agreement. The $r_{WG(J)}$ is developed on a scale from 0 to 1.0 with scores above 0.70 demonstrating agreement within the team. The second measure of within group agreement was the within and between groups ANOVA.

Conflict

Conflict was measured with six items adapted from Jehn's (1994) interpersonal conflict scale (ICS). The ICS has been employed in a variety of settings including work groups (Jehn, 1995) and top management teams (Amason, 1996) and has been shown to effectively measure affective and cognitive conflict. Each respondent was asked to think of the most recent major strategic decision his or her firm had made and then answer questions about the level of conflict experienced during the making of that decision (Amason, 1996; Amason and Sapienza, 1997; Flanagan, 1954). Linking the responses to a common incident in this way reduces recollection bias (Podsakoff and Organ, 1986) and facilitates the combining of individual responses into team-level variables.

Exploratory factor analysis demonstrated within and between statistical structure for the conflict measure. The coefficient alphas ranged from 0.79 to 0.88. The $r_{WG(J)s}$ for the conflict measure ranged from 0.86 to 0.92. All within team and between team ANOVAs were also significant.

Shared strategic cognition

Shared strategic cognition was measured as the coefficient of variation of the Strategic Orientation of Business Enterprises or STROBE scale. The STROBE scale, developed by Venkatraman (1989), is a 33 item, seven dimension scale intended as a measure of business level strategy. Previous research has demonstrated the STROBE scale to have sufficient levels of reliability and validity (Venkatraman, 1989). We found coefficient alphas that ranged from 0.68 to 0.79. This is similar to Venkatraman's (1989) and Ensley's (1999) findings on this scale. Others have used the scale recently and found high levels of reliability and validity associated with this scale (Kotey and Meredith, 1997; Chan *et al.*, 1997; Masoud and Haug, 1997; Tan and Litschert, 1994; Voss and Voss, 2000). The seven dimensions of the scale are aggressiveness, analysis, defensiveness, futurity, proactiveness, innovativeness, and riskiness. This scale and other forms of this scale have been utilized by other researchers (see Covin, 1991; Covin and Slevin, 1989; Miller and Friesen, 1982, 1983).

All of the constructs of the STROBE scale were found to have acceptable levels of inter-group reliability – the $r_{WG(J)s}$ ranging from 0.81 to 0.93 – and all of the within and between team ANOVA F statistics were significant.

These constructs have long been accepted as having the psychometric properties of the idea of strategy itself. They are predicated on the idea that strategy has several characteristics (Miller, 1990; Miller and Friesen, 1982; Venkatraman, 1989) and have been theoretically derived to be included. The foundation for the use of these scales is then quite clear. The scale was designed as a perceptual measure of how much of each type of strategy exists in the firm (Venkatraman, 1989).

Cohesion

Cohesion was measured with a scale developed by Bollen and Hoyle (1990). As discussed earlier, cohesion is an established and well researched construct (Gross and Martin, 1952; Lott and Lott, 1965). In Bollen and Hoyle's (1990) definition, however, cohesion is not so much an objective phenomenon but rather lies in the perceptions of the beholder. Specifically, they define cohesion as 'an individual's sense of belonging to a particular group and his or her feelings of morale associated with membership in the group' (1990, p. 482). Perceived cohesion can be distinguished from objective cohesion in that it reflects individual appraisals of each member's relation to the group. Specifically,

'appraisals of their relationship to the group results in judgements of their personal sense of how much they belong to the group and their personal feelings of morale associated with membership in the group' (1990, p. 482). As such, perceived cohesion is likely to mediate the relationship between objective cohesion and individual behavior. It is this attribute that makes the measurement of perceived cohesion especially appropriate for our study.

As a check for task cohesion we phoned all of the CEOs in the study and asked them to identify all of the executives that were an integral part of the strategic decision making task and had high levels of what Hambrick (1981) called 'strategic awareness.' Only those identified as being a critical part of the development of strategy were included in the sample. Therefore we focused our attention on issues of social cohesion issues rather than task cohesion.

To actually measure cohesion, we employed Bollen and Hoyle's (1990) perceived cohesion scale (PCS). The PCS contains six items, three of which assess the individual's sense of belonging and three of which assess the individual's feelings of morale. Responses are recorded using a 5-point Likert scale. In a study employing two very different samples, Bollen and Hoyle (1990) found psychometric support for their conceptualization and measurement of perceived cohesion using these six items. Likewise, Chin *et al.* (2000) examined the psychometric properties of the PCS, using confirmatory factor analysis to test the two-factor structure and goodness-of-fit indices for the belonging and morale constructs. The two factors yielded Cronbach alphas of 0.95 and 0.87, respectively. Thus, we adopted the small group Bollen and Hoyle (1990) measure with no changes except in the identification of the group itself. In this study, the Cronbach alpha coefficients for the subscales were 0.83 for morale and 0.85 for the sense of belonging.

For the feelings of morale construct, the $r_{WG(J)}$ was 0.87. The within and between team ANOVA F statistic was 2.443 with 69 and 107 degrees of freedom ($p < 0.01$). For the sense of belonging construct of the cohesion measure, the $r_{WG(J)}$ was 0.91. The within and between team ANOVA F statistic was 2.57 with 69 and 106 degrees of freedom ($p < 0.01$).

Performance

Performance was measured in three ways. Sales growth was calculated as cumulative growth experienced by the firm during the past five years. Sales growth is arguably the most important single indicator of new venture performance (Brush and Vanderwerf, 1992). Growth has been included consistently in new venture performance research (Sandberg, 1986; Zahra, 1993). We also measured profitability and sales or revenue volume. Because the firms in the sample were closely held, our ability to gather performance data was limited to that available through *inc.* Magazine. However, to be included in the *inc.* 500, a firm must submit five years of audited financial information. The sales growth measure was taken directly from this data. Total revenue or sales volume was taken directly from this data as well. Information about venture profit, however, was provided only in the form of a 6-level categorical variable developed by the *inc.* compilation team. The ranges include profit as a percentage of sales that was less than zero, 1–5 per cent, 5–10 per cent, 11–15 per cent, and greater than or equal to 16 per cent.

Analysis technique

Because our measures of cohesion and conflict were perceptual and were collected using a single survey, we first performed a procedure to control for common method variation. For a thorough description of this data-splitting procedure please see Amason (1996) and Amason and Sapienza (1997). The actual hypothesis tests were conducted using path analysis run in LISREL 8. The variables were collapsed into single indicators and a causal model was developed.

Results

Six path analyses were conducted: three with each sample on each of the three performance variables. Fit with all of the models was outstanding. The 1994 path models were fully saturated and therefore fit was found to be perfect. The 1995 models were less perfect but their goodness-of-fit indexes ranged from 0.94 to 0.97. They also all had non-significant *chi-square* tests. The root mean square residual ranged from 0.01 to 0.09. Following the suggestions of Bollen and Long (1993) we find that the preponderance of the evidence shows substantial fit of the data to the path models. The path analysis results are presented in Figure 1. Only significant paths are presented.

Since cohesion was only included in the second sample, only the 1995 *inc.* 500 was used in testing hypotheses 1 and 2. Both samples are used in testing hypotheses 3 through 6c. The first hypothesis stated that there was a positive link between cohesion and cognitive conflict. This hypothesis was

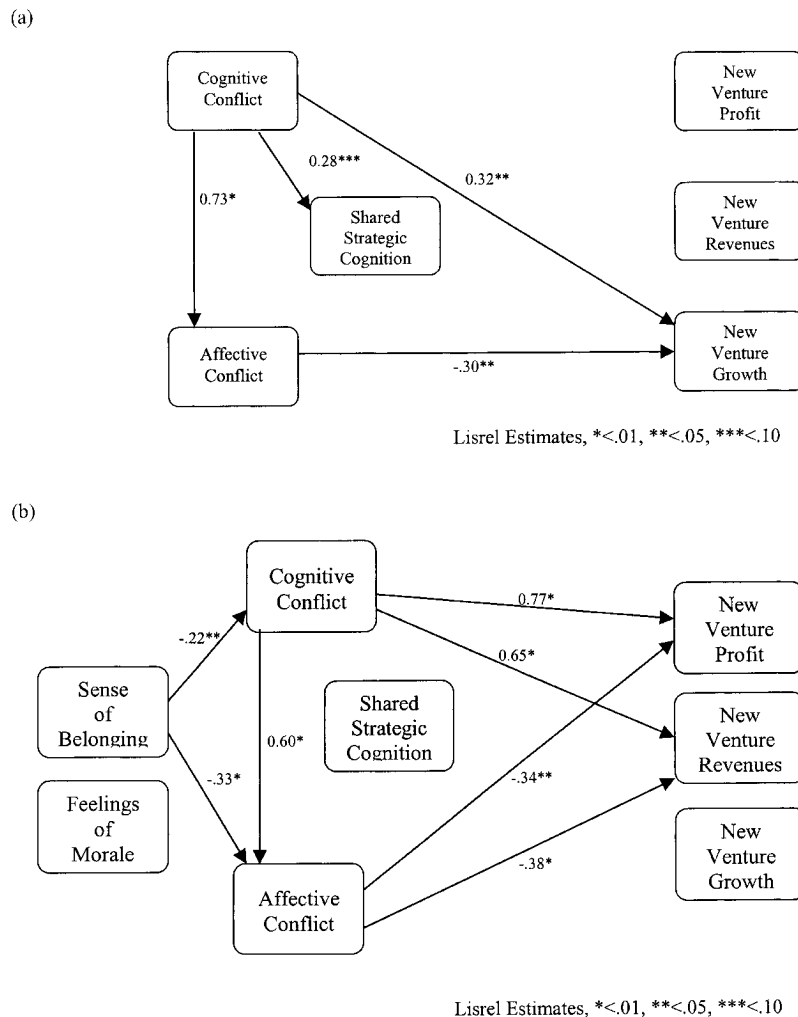


Figure 1. (a) 1994 significant paths in three path analyses. (b) 1995 significant paths in three path analyses



not supported. The findings of the path analysis show a negative relationship between the cohesion construct, sense of belonging, and cognitive conflict.

The second hypothesis stated that cohesion is negatively related to affective conflict. The findings from the 1995 *inc.* 500 sample show a strong negative relationship between sense of belonging and affective conflict. Therefore the second hypothesis is supported.

The third hypothesis stated that affective and cognitive conflict would be related. The correlation matrix in Table 1 bears this out. There is a positive relationship between cognitive and affective conflict in both samples ($r = 0.56$ for 1995 sample and $r = 0.48$ for the 1994 sample). In addition, both of the path analyses bear out this finding showing that in the causal model the same relationship works as well. Therefore hypothesis 3 was supported.

Hypotheses 4 and 5 proposed links between cognitive and affective conflict and shared strategic cognition. All of the path analyses samples show only a relationship between cognitive conflict and shared strategic cognition for the 1994 sample. Therefore, we find weak support for hypothesis 4 and no support for hypothesis 5.

Hypothesis 6a, 6b, and 6c were tested using the two sets of path analyses conducted on the 1994 and 1995 samples. Hypothesis 6a posited a positive link between shared strategic cognition and firm performance. The findings show no support for Hypothesis 6a. Hypothesis 6b proposed a direct positive link between cognitive conflict and firm performance. Cognitive conflict was found to positively impact new venture profit and sales in the 1995 sample and new venture growth in the 1994 sample. Thus, hypothesis 6b was supported. Hypothesis 6c posited an inverse relationship between affective conflict and firm performance. Affective conflict was found to have a negative influence on new venture profit and revenues in the 1995 sample and a negative link to growth in the 1994 sample. Thus, hypothesis 6c was supported.

Discussion

Recently, models of shared cognition have generated much interest in the groups and teams literature (e.g., Cannon-Bowers *et al.*, 1993; Klimoski and Mohammed, 1994; Pearce and Ensley, 2000 – Paper presented to the Annual Conference of the Academy of Management, Toronto). Following the lead of both Cannon-Bowers *et al.* (1993) and Klimoski and Mohammed (1994), we developed a rich model of the group processes through which shared strategic cognition may be developed and how those processes, as well as shared strategic cognition, may relate to organizational performance. Overall, our *a priori* models fit the data extremely well. However, our specific hypotheses found mixed support. For example, cohesion was not found to be positively associated with cognitive conflict. In fact, the belongingness component of cohesion was found to be negatively related to cognitive conflict. In retrospect, the belongingness items veer toward what Janis (1982) and Mullen *et al.* (1994) would term interpersonal attraction, which they found to be linked to the development of groupthink – or lack of cognitive conflict. Thus, it appears that the specification of cohesion is critically important in the articulation of how cohesion may impact the development of shared cognition in groups. *Viz.* interpersonal attraction components of cohesion may impede the cognitive processes that lead to the development of shared cognition, while more task related cohesion may facilitate these processes. This is a question that will need to be addressed by future research.

On the other hand, the belongingness component of cohesion did seem to suppress affective conflict, which has been shown to be detrimental to group processes and outcomes (e.g., Amason, 1996; Ensley *et al.*, 1999). This also seems in line with the groupthink literature, where personal attraction between group members is thought to suppress disagreement and especially interpersonal friction (Janis, 1982;

Mullen *et al.*, 1994). It is yet to be determined if task related cohesion has a similar effect, but the tentative evidence seems to suggest it would. This will prove a useful line of inquiry for future research.

As has been suggested by previous research (Amason, 1996; Jehn, 1995, 1997; Ensley *et al.* 1999), we found cognitive conflict to lead to higher levels of affective conflict. While this result, in-and-of-itself, is not entirely new, in combination with the aforementioned suppressional effect of cohesion on affective conflict, this research may point to a fruitful avenue for ensuring that appropriate levels of cognitive conflict can occur (see Hambrick, 1994; Janis, 1982), while the 'spill-over' to affective (detrimental) conflict can be mitigated. Again, future research would do well to incorporate task-related models of cohesion to determine if this effect may be further enhanced.

In study one we found cognitive conflict to be positively associated with shared strategic cognition and this result is in congruence with Klimoski and Mohammed's (1994) argument that team processes impact the development of team mental models. In the current study then it appears that the team process of engaging in cognitive discussion of the elements of organizational strategy can positively impact the shared understanding of the mental maps of TMT members and thus lead to shared strategic cognition. On the other hand, we hypothesized that the process of affective conflict would detract from the development of shared strategic cognition. We found no evidence to support this supposition. Perhaps the levels of affective conflict present in the TMTs in our studies were simply not great enough to manifest themselves in negative consequences. Range restriction may have also prevented our ability to find results here. For example, in TMTs the top executive has great latitude in hiring and firing decisions. Given this context, particularly disruptive members may simply be removed before negative events reach a tipping-point. Conversely, this may not always be the case for teams at lower levels of organization where the team leader simply has to accept whomever he/she receives in terms of team members. Thus, we would not rule out the potentially damaging role of affective conflict on the development of shared cognition in teams. Rather, we would suggest widening the context in which it is studied.

Why would we find dissimilar results across the two studies regarding the role of cognitive conflict? We might speculate that the demographic differences across the studies may play into this explanation. However, more likely, since structural equations models are particularly sensitive to model specification, and model two includes two additional variables, it is highly likely that the relationship is not detected due to model specification. To test this assumption we respecified model two without the cohesion variables and the path from cognitive conflict to shared strategic cognition became significant.

On the downside, we were disappointed to not find any direct relationship between shared strategic cognition and organizational performance. This seems contrary to what most strategy literature would predict (e.g., Amason, 1996; Dess, 1987). However, on reflection, this result is more in line with shared cognition literature. For example, while Klimoski and Mohammed (1994) stated that group processes and shared cognition would be interrelated, they did not propose any direct relationship between shared cognition and group performance. Rather, they suggested that the performance effects of shared cognition would be felt through the processes that lead to the creation of shared cognition.

In fact, this is exactly what we found. In both samples, both cognitive and affective conflict were found to be related to some dimensions of organizational performance. In study one, both cognitive and affective conflict were related to new venture growth and in study two both cognitive and affective conflict were related to profit and revenue. Thus, a conclusion of this study might be that the process of developing shared strategic cognition is more important than the specific components of that cognition once formed. However, we are not convinced that there is no direct effect. For example, examination of zero order correlations in studies one and two demonstrate that a direct relationship is observable. Thus, it simply may be that due to the complex nature of the models we specified that this relationship was undetectable. Future research designs might examine potential augmentation effects of the processes versus the contents of shared strategic cognition.

Conclusion

In conclusion, this research placed an important spotlight on both the processes that lead to the creation of shared strategic cognition as well as the content of said shared cognition in an important organizational context – that of new venture top management teams. While this context may limit the generalizability of the results, due to the important role such firms occupy in the economy, the investigation of factors that aid or impede their success seems particularly important. This is not to say that research on shared cognition should be limited to TMTs or new ventures. Conversely, we are encouraged by the initial research in this area and suggest that it is a useful concept for incorporation into a multitude of research settings. Thus, we encourage future research on shared cognition to examine, not only TMTs and new ventures, but also teams at all levels of organization in an attempt to develop a richer theory of the antecedents and consequences of shared cognition in teams.

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