



## EXAMINING THE EFFECT OF COMPLEXITY IN STRATEGIC GROUP KNOWLEDGE STRUCTURES ON FIRM PERFORMANCE

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*A developing stream of research in the strategy field explores the competitive structure of industries from the perspective of industry participants. This work has demonstrated that managers develop strategic group knowledge structures in order to make sense of their competitive environment. This study extends this line of research by examining the complexity evident in the strategic group knowledge structures developed by firms' top management teams and assessing the relationship between complexity in these knowledge structures and subsequent firm performance. Specifically, we examine the complexity of top managers' knowledge structures regarding their competition using a sample of 76 top management teams from banks in three U.S. cities. Using hierarchical regression, we find a significant relationship between the complexity of cognitive strategic groups and subsequent firm performance. These results suggest that the structure of the cognitive templates that top managers use to understand their environment and the actions of their competitor influence the degree of strategic success of their firm. Copyright © 2002 John Wiley & Sons, Ltd.*

The manner in which top managers view their competition is considered a key determinant of the strategic plans they make and the subsequent competitive actions taken by their firms (Andrews, 1971; Child, 1972; Hambrick and Mason, 1984). Competitive actions, in turn, are believed to affect a firm's financial performance (Porter, 1980). In an effort to understand how firms are strategically positioned and what leads firms to make the competitive decisions they do, numerous strategic management scholars have explored the cognitive groupings of competitors developed by managers (Baum and Lant, 1995; Bogner and Thomas, 1993; Fiegenbaum and Thomas, 1995; Porac and Thomas, 1990, 1994; Porac, Thomas, and Baden-Fuller, 1989; Reger and Huff, 1993; Reger and

Palmer, 1996). This body of research suggests that CEOs and top management teams (TMTs) do, in fact, cognitively categorize their competition, and that their viewpoints are relatively homogeneous within competitive sectors of an industry. The implication of similarity in mental models is that firms will tend to behave similarly when it comes to competitive actions (Bogner and Thomas, 1993).

Although the cognitive strategic groups literature has increased our understanding of an important cognitive simplification tool used by managers to make sense of their competitive environment, this line of research, to date, has not directly explored the relationship between the structural attributes of managerial knowledge structures regarding their competition and firm performance. Prior research on cognitive strategic groups has primarily focused on the similarity in the models held by managers, but this ignores the potentially important differences found across firms. The knowledge

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structures held by top managers may offer their firms different insights into the potential market niches open to them, the positioning of potential rivals, and the defensibility of their own competitive position. While the nature of strategic group knowledge structures may vary across TMTs in multiple ways, a primary dimension on which they may differ is the level of complexity found in their models. Numerous management researchers (Miller, 1993; Schneier, 1979; Voyer, 1993; Weick, 1979) have discussed the importance of simplicity/complexity in explaining differences in firm action and performance. Drawing on this work and prior research on cognitive strategic groups, we explore the relationship between the complexity of the cognitive strategic group knowledge structures constructed by TMTs and the performance of their firms.

## THEORY AND HYPOTHESES

### Background

The nature and value of the cognitive frameworks, or knowledge structures, utilized by managers have gained increasing attention in the management field over the last several years (Walsh, 1995). Knowledge structures have been defined by Walsh as 'mental templates consisting of organized knowledge about an information environment that enables interpretation and action in that environment' (Walsh, 1995: 286). In order to create manageable information sets, managers typically utilize top-down information processing and generate cognitive knowledge structures that simplify their information field (Walsh, 1995). These knowledge structures range from heuristics that are designed to create decision-making short-cuts to simplification systems where a large number of information points are coded into a manageable number of categories (Schwenk, 1984). The knowledge structures of interest in this study are the cognitive strategic group structures held within firms. These structures are a reflection of the knowledge of the TMT regarding the arrangement and behavior of their competition in the marketplace (Lyles and Schwenk, 1992; Walsh, 1995) and are likely to serve as a basis for its subsequent strategic decision making (Porac and Thomas, 1990; Porac *et al.*, 1989).

One of the primary reasons knowledge structures arise is the cognitive limitation of individuals

to absorb and recall large amounts of information (Neisser, 1976). As Stubbart points out, 'if thought only advanced by unique instances instead of categories, human perception and memory would rapidly overload with insignificant details' (Stubbart, 1989: 332). Knowledge structures are convenient and efficient methods for categorizing information because they simplify perceptions of environmental stimuli (Walsh, 1995). They create perceptual filters that allow managers to emphasize relevant information while disregarding irrelevant information (Starbuck and Milliken, 1988). However, as knowledge structures simplify and screen input, they may create 'blind spots' that block awareness of important developments as they arise in the environment (Zajac and Bazerman, 1991) or create biases in interpretation of information (Schwenk, 1984).

Although early studies of cognitive strategic groups focused primarily on the similarities in the mental models used by managers to understand the competitive structure of their industries (Porac *et al.*, 1989; Reger and Huff, 1993), a few recent studies have noted differences in the cognitive strategic group structures of managers in different segments of the industry (Baum and Lant, 1995; Porac and Thomas, 1994) and in turbulent environments (Reger and Palmer, 1996). In addition to differences in *content* of cognitive strategic groups, we believe that there will also be differences in the level of *complexity* in managers' models. Management researchers have concluded that levels of complexity in mental models differ from one individual to the next (Downey and Slocum, 1982; Hitt and Tyler, 1991). Similarly, the complexity of knowledge structures has been found to differ depending on the individual's domain-specific expertise (Hershey *et al.*, 1990; Lurigio and Carroll, 1985). Specifically, these researchers have found that the number of categories within the person's knowledge structure and the number of information units within each category vary systematically with the level of expertise of the individual (Lurigio and Carroll, 1985). Finally, several studies have suggested that the degree of complexity in individuals' mental models affect their actions (Lurigio and Carroll, 1985; Stabell, 1978; Tetlock, 1984) while others have suggested that the level of complexity will affect the performance of individuals and firms (March and Simon, 1958; Miller, 1993).

### The benefits of complexity

Researchers and theorists have expressed concern regarding the pitfalls of simplification and have espoused the benefits of developing more complex knowledge structures in order for the TMT to respond appropriately to the organization's environment (Bartunek, Gordon, and Weathersby, 1983). Miller (1993) warns of the danger for organizations that simplify their strategies over long periods of time, predicting that simplification will lead to decrements in firm performance. Weick offers advice to managers coping with the multidimensional challenges of their environment by counseling them to 'complicate yourself.' He goes on to state 'the importance of complication is difficult to overemphasize' (Weick, 1979: 261). Voyer (1993), in his study of the pharmaceutical industry where he indirectly constructs firm causal models by analyzing letters to shareholders, concludes that firms with more complex mental models may perform better than firms with simpler models. The explanation for the relationship between complexity of knowledge structures and performance is simple but powerful. Managers with more complex mental models have more preexisting dimensions about their industry in 'memory' and have the potential to utilize more dimensions for understanding and discriminating the behaviors of competitors. Furthermore, knowledge structure complexity helps managers 'deal with ambiguous and inconsistent information' (Schneier, 1979). Given the complexity of TMTs' decision-making domains, the level of complexity in the mental models that managers draw upon should have implications for their firms' performance. Based on these theoretical and empirical foundations, we predict that the degree of complexity of the cognitive strategic groups identified by the TMT will be positively related to the subsequent performance of the firm.

Complexity in knowledge structures is a multi-dimensional construct, best assessed with multiple measures. As Lurigio and Carroll (1985) demonstrated, complexity can be seen in both the number of categories identified by a respondent and the amount of data points coded into each category. Similarly, Porac and Thomas (1994) and Porac *et al.* (1995) suggested that two dimensions relevant in viewing cognitive strategic group structures are the number of taxonomic categories

identified and the number of competitors about which managers are knowledgeable. Building from this perspective, we measure complexity using three dimensions. The first two relate directly to the prior work on cognitive categorization: the number of strategic groups identified and the number of firms for which managers can identify a strategy. By combining the first two measures, we can examine a third aspect of complexity: the size of the groups identified by managers. Since we are assessing the effect of complexity within the TMT, individual responses are aggregated to a team level. Although measurement of collective cognition is not without its difficulties, strategic assessment and decision making is clearly a team process in most firms (Hambrick and Mason, 1984; Walsh, 1995). In aggregating individual responses to the team level, we follow the lead of prior research that has empirically assessed group-level cognition in developing the TMT-level variables in our study (see, for example, Walsh, Henderson, and Deighton, 1988).

### *Number of strategies identified*

Our first dimension of the complexity of a TMT's mental model of cognitive strategic groups is the number of strategies being pursued within the industry. The number of strategies identified by a TMT can be considered a differentiation dimension of its knowledge structure. Differentiation is represented by the number of dimensions or categories within a knowledge structure (Bartunek *et al.*, 1983; Walsh, 1995). While Porac and Thomas (1994) concluded that managers typically employ a moderate level of differentiation in their cognitive structures, teams can be expected to vary in the amount of information they have gathered regarding the strategies employed by competing firms.

Teams that have collected a greater amount of data regarding viable strategic niches for firms in their markets may be expected to have a more comprehensive understanding of how their own strategies fit into the competitive landscape. They will be able to more clearly discriminate between those competitors that are truly direct rivals and those that serve different market needs than those firms that have very coarse strategic group structures. They may also hold a deeper level of understanding of the existing competitive niches within their market. This may increase their awareness of the

value of developing specialized sets of resources to meet specific market segment needs (Porter, 1996). Consequently, we predict that performance of firms will be positively related to the number of strategies identified by their top managers.

*Hypothesis 1: The relationship between the number of strategies a top management team identifies in its market and subsequent firm performance will be positive.*

#### *Number of competitors categorized*

In addition to the number of strategies identified, management teams are anticipated to vary in the number of competitors of which they are strategically aware. Porac *et al.* argue that 'firms can be knowledgeable about only a limited number of other organizations' (Porac, *et al.*, 1995: 207). Thus, they will be able to identify the relevant competitive strategy for only a subset of the total number of industry participants in their market. This aspect of cognitive grouping reflects a different type of environmental knowledge than identifying the number of strategies being used by competitors in the market.

Those teams which have thoroughly scanned their competitive environments and have a high level of familiarity with the specific strategies of firms in the same industry will be better able to anticipate their competitors' strategic actions (Lant, Milliken, and Batra, 1992). They may assess their particular opportunities and threats in the marketplace in a more refined and potentially appropriate manner. Consequently, they should be better positioned to respond to competitive threats and opportunities than firms that have little understanding of the competitive positioning of their rivals. Further, they are more likely to understand the potential interdependencies that exist between their firm and their competitors. The teams which have developed a more complete picture of their competitor's activities may, therefore, be in an improved position to formulate their own strategies effectively compared to TMTs with less understanding of competitors' strategic positioning.

*Hypothesis 2: The relationship between the number of competitors that top management teams categorize into their strategic group knowledge structures and subsequent firm performance will be positive.*

#### **The moderate complexity perspective**

In contrast to the simple, linear relationships hypothesized in the prior section, several management scholars have proposed arguments suggesting that the relationship between complexity and subsequent firm performance will be curvilinear. It may be that moderate levels of complexity are best and that extremes on either end of the spectrum will result in lower performance. Ashby (1956) and Weick (1979) discuss the importance of the 'law of requisite variety' in matching the level of complexity to the demands of the environment. Calori, Johnson, and Sarnin (1994) echo this theme in reinforcing the importance of CEOs of firms having an adequate level of cognitive complexity in order to respond appropriately to their diverse environments. Relatedly, Snyder (1981) found the magnitude of environmental scanning to have a parabolic relationship to firm performance. Prahalad and Bettis (1986) discuss the importance of the TMT's handling of the 'strategic variety' of its business and the key role of the complexity of its mental model in the ability of the team to do so effectively. All of these perspectives suggest that there is an appropriate level of complexity and firms that drift significantly above or below that level will see their performance suffer.

*Hypothesis 3: The relationship between the number of strategies a top management team identifies in its market and subsequent firm performance will be curvilinear, with the highest level of performance in firms whose teams identify a moderate number of strategies.*

*Hypothesis 4: The relationship between the number of competitors that top management teams categorize into their strategic group knowledge structures and subsequent firm performance will be curvilinear, with the highest level of performance in firms whose teams categorize a moderate number of competitors.*

#### **The structure of knowledge sets**

Up to this point, the examination of cognitive complexity has focused on the depth of knowledge in managers' models by exploring the individual dimensions within strategic group structures. However, this ignores the importance of the combination of this dimensional data into the actual

knowledge structures held by managers. A third attribute of cognitive strategic group complexity is measured to assess the structural nature of the cognitive groups developed within TMTs. This element of complexity is composed of the first two dimensions within the TMT's knowledge structure of its competition. By dividing the number of competing firms for which the TMT can identify a predominant strategy by the number of strategies identified, we can measure the average size of the strategic groups identified by the TMT. This aspect of complexity combines the two differentiation dimensions of number of strategies and number of firms with identified strategies to obtain an integrative or structural dimension of strategic group knowledge structure complexity (Bartunek *et al.*, 1983; Walsh, 1995).

Hypotheses 1 and 2 taken to their logical conclusion suggest that the best performing firms will identify a large number of strategies being employed and code virtually all firms into one of these strategies. However, this may result in information sets that are no longer of a manageable size (Miller, 1993; Walsh, 1995). Consequently, there may be benefits derived from focusing cognitive energy in a manageable way when codifying the competitive environment.

In making a prediction regarding the relationship of average cognitive group size with firm performance, several theoretical arguments are tenable. First, if it were important for managers to have balance in their mental models, then a moderate group size would be optimal since it would tend to reflect balance between the level of complexity in the two primary dimensions (number of strategies and number of firms categorized). Being exclusively focused on one of the two dimensions may lead to competitive 'blind spots' (Zajac and Bazerman, 1991), which may in turn lead to declining firm performance.

However, it may also be that TMT members are better off focusing their limited cognitive abilities more on one of the two dimensions than the other. If their cognitive strategic group models reflect greater emphasis on understanding the competitive segmentation of the market and less emphasis on the strategies of particular firms, their average group size will tend to be very small. A firm of this type may be able to target its own strategy more specifically and thus have a performance advantage. These firms may be able to

position themselves into focused niches of the market, thereby reducing the competitive threats that they face from other competitors. At the same time, they may be leaving themselves vulnerable competitively due to their low awareness of the specific strategies being employed by their competitors. In fact, they easily could be under-identifying the degree of competition they face from other firms within the industry.

Conversely, teams identifying relatively few strategies, but having a broader understanding of the application of those general strategies as employed by a substantial proportion of their competitors, may be the firms which are in a better position to target their strategies to the market. By maintaining relatively large average group sizes within their strategic group knowledge structure, firms falling into this category might be in a position to reap the benefits of having a comprehensive awareness about the strategies of their competitors while, at the same time, categorizing this knowledge into a cognitively manageable number of groups. Such firms could be expected to have a generalized approach to their strategy development, but be specifically knowledgeable about how their strategy fits into the market compared to the majority of their competitors. However, a firm showing this type of cognitive strategic group complexity could be naive regarding the variety of strategies being employed by competitors, and thus miss threats or opportunities due to a lack of sophistication in strategy identification, even though its team is knowledgeable regarding the general strategic behavior of its competitor firms.

In sum, the nature of the relationship between average cognitive strategic group size and firm performance is not theoretically straightforward. However, Lurigio and Carroll's (1985) examination of individual knowledge structures indicates that 'experts' tend to have relatively broad categories with numerous information points within each category. Conversely, 'novices' tend to develop more categories with less information within each category (see also Rentsch, Heffner, and Duffy, 1994, for similar results). Further, Sujan, Sujan, and Bettman (1988) found that more effective professionals had more information in their cognitive categories than less effective performers.

Although the results of these studies are not conclusive, they do suggest that more knowledgeable and successful individuals, and by extension firms'

TMTs, will exhibit coarser grouping structures with more objects categorized into each group. Similarly, Fiol (1994) argues that knowledge structures should be relatively broad in order to allow for organizational learning and flexibility. In reference to average group size, this line of reasoning would suggest that larger group sizes would be more beneficial than highly segmented small groups. Therefore, it is hypothesized that the nature of managers' integrated knowledge structures, consisting of the ratio of the number of firms with identified strategies to the number of strategies identified, will be related to subsequent firm performance. Specifically, we hypothesize that firms whose TMTs have mental models of their competitive environment consisting of larger cognitive strategic groups will be more successful than firms with smaller group sizes.

*Hypothesis 5: The relationship between the average size of strategic groups within a top management team's knowledge structure and subsequent firm performance will be positive.*

## RESEARCH METHODS

### Respondents and procedure

The data used in this study were collected on and from commercial banks in three large, metropolitan areas of the United States: Denver, Milwaukee, and Minneapolis/St Paul. A comprehensive review of the number of banks operating in each of the areas was conducted using the *Polk Financial Institutions Directory* for year end 1993. An asset cut-off level was used for inclusion in this study since extremely small banks are more likely to be managed by a single executive, rather than a TMT. Based on discussions with two bank presidents and a senior vice president of a large banking institution, a cut-off level of \$40 million in 1993 was identified as appropriate for distinguishing banks that were large enough to have a TMT. In total, 131 banks were identified for inclusion in the study.

Two major sources of data were used for this study. Information on TMT perceptions was collected using a survey questionnaire of top managers in banks selected for inclusion in the study. Financial information was collected from annual volumes published by Sheshunoff Information Services.

The project was discussed initially with either the CEO or his/her appointed representative at 123 of the 131 banks. We were unable to reach the remaining eight CEOs. Ninety-seven of the 131 firms, or 74 percent, agreed to participate in the study. As part of the discussion with the CEO, the CEO was asked to identify the members of the TMT of his/her bank. The framework originally developed by Bantel and Jackson (1989) was used for the identification of the TMT. CEOs were asked to identify which managers were actively involved in decisions regarding products and services, marketing, delivery systems and operations, and general management and administration on an ongoing basis. The CEOs of the firms that agreed to participate identified a total of 421 managers comprising their TMTs. The identified TMTs ranged in size from 2 to 13 individuals, with a mean team size of 4.3 and a standard deviation of 1.8. Although we chose not to identify TMT members *a priori* based on their titles, we asked the CEO to identify the title of each of the identified individuals.<sup>1</sup> These titles reflect the types of positions we would expect to find in the upper echelons of firms. Our survey sample included 86 CEOs,

<sup>1</sup> We chose to use CEO-identified TMTs since we would expect that this list would most accurately reflect the actual body of managers involved in important firm decisions. At the same time, since many of the studies on top management teams have used top manager lists reported in public documents such as firm proxy statements, it may be instructive to compare the self-identified teams with those reported in these public documents. To do this, we searched for proxy statements for all of the firms included in our study. Unfortunately, most of the banks in our sample are either privately held or are owned by a larger bank holding company. Therefore, we were only able to find proxy statements for three of the 76 banks in our data panel. In comparing the self-identified and proxy lists of top managers, we found very tentative evidence that the top management teams reported in the proxy statements may underestimate the number of individuals involved in the strategic decision-making process. For one of the three banks, Tri City National Bank, we found that the self-identified and proxy TMTs were identical. For Vectra Bank, both lists included the CEO, the CFO, the chief consumer credit officer, the chief credit policy officer, and a regional president. However, the CEO also included a second regional president and the chief technology officer in his self-identified team. For National City Bank, the proxy statement included the chairman of the board, the CEO, and the senior vice president/controller on the top management team. However, the CEO identified two additional senior vice presidents and three vice presidents as members of the top management team. Therefore, it may be beneficial for future research to examine the similarity of proxy statement- and CEO-identified TMTs with a population of firms for which a more comprehensive comparison can be made to assess the validity of proxy statement-identified top management teams. We thank Karel Cool and one reviewer for identifying this important issue.

1 chairman, 4 vice chairmen, 44 presidents (typically carrying regional president titles), 45 executive vice presidents, 98 senior vice presidents, 116 vice presidents, 11 assistant vice presidents, 1 controller, 13 officers, and 2 branch managers.

A cover letter and questionnaire were then mailed to each of the TMT members of the participating banks in late 1994. Responses were received from 296, or 70 percent of the TMT members, from 95 firms. Several banks were acquired by other banks before the final firm performance data were collected. We also excluded firms for which the CEO did not complete a survey, resulting in a total sample of 76 firms. From these 76 firms, we received responses from 234 of the 310 top managers identified by the firms' CEO, for a response rate of 75.4 percent for the firms included in the analyses. The average number of responses per team was 3.1, and the standard deviation in the number of respondents was 1.6. Means difference tests were performed to determine if the firms participating in the study were representative of those asked to participate. The results indicated there was no significant difference in either size or profitability between the firms participating and those not participating in the study ( $t = 1.31, p = 0.19$ ;  $t = 1.38, p = 0.17$ ).

## Measures

### *Strategic group knowledge structures*

In keeping with the intent to elicit information regarding the knowledge structures of managers in formulating strategic group knowledge structures, it was desirable to design the questionnaire to allow as much flexibility as possible in managers' responses. Several methods utilized in earlier studies for identifying managers' group knowledge structures were evaluated (Porac *et al.*, 1989; Reger and Huff, 1993; Baum and Lant, 1995). However, these methods were either inappropriate for use in a survey study or did not capture the entire cognitive group structure. Although their actual technique was not comprehensively presented in their paper, Porac *et al.* (1989) appeared to utilize open-ended questioning that would not be feasible for use in a large-sample, questionnaire study. Reger and Huff (1993) utilized a repertory grid technique for identifying individuals' underlying cognitive structures. While this technique has several strengths, it also has two key weaknesses.

First, it does not directly provide the underlying structure, which instead is inferred from cluster analysis results. Second, it cannot be easily translated into a questionnaire format. Finally, Baum and Lant's method (1995) allows a researcher to see whether or not other firms are seen as direct rivals, but it does not provide the managers' perceptions of the overall industry structure. Since none of these methods was well suited to the design and purpose of the present study, a new method was used to identify managers' cognitive groupings of industry competition. A brief definition of the term 'firm strategy' was given to managers from a management textbook (Thompson and Strickland, 1993). Respondents were then asked to identify a set of 'general strategies' used by banks to compete in their metropolitan area. The survey instructions told them they could list as few or as many strategies as they thought were necessary to cover those used by banks competing in their area.

Managers were given a list of the banks in their metropolitan area and asked to identify which of their self-generated strategies each of the banks followed. An asset cut-off of \$80 million was used for the list of banks since we wished to keep the questionnaire to a manageable length, and it was considered unlikely that many managers would be familiar with banks smaller than \$80 million in assets. This cut-off level was arrived at after consultation with a local executive in banking.<sup>2</sup> Managers were given the option to not categorize any banks with which they were not familiar.

Three separate measures of strategic group complexity were calculated, initially at the individual level. First, the number of taxonomic categories reflects the number of 'general strategies' listed by each manager. Second, the number of firms categorized reflects the number of firms contained in the questionnaire for which a respondent felt comfortable identifying a generic strategy. Third, the average group size was calculated by dividing

<sup>2</sup> It should be noted that since banks included in our sample may have assets as low as \$40 million, they might see some banks in their markets as competitors whose assets are below \$80 million. Consequently, we may not be capturing all of the possible competitors that the managers see in their environmental scanning. To insure that using an asset cut-off level that was greater than the size of some of our respondents did not affect our results, we ran an additional analysis in which we included only banks in our sample with asset levels above \$80 million. The results from this analysis were consistent with those reported here.

the number of firms categorized by the number of strategies listed. Our group size construct focuses on one aspect of size, the average number of firms perceived to be following a similar strategy. We focus on this attribute of group size, rather than using other barometers of size such as average revenues or number of employees, since it reflects the focus of prior research examining how managers cognitively structure their competitors and relates directly to our base complexity variables.

#### *Team-level measures of complexity in strategic group knowledge structures*

Since the focus of this study is the effect of the cognitive complexity of the mental models of TMTs on the performance of the firm, the individual-level data needed to be aggregated in some manner to be indicative of a team-level cognitive structure. Ginsberg (1990) theorizes that the cognitive complexity of a group, such as a TMT, reflects the cognitive complexities of its individual members. However, we were reluctant to use a simple aggregation of individual-level measures of knowledge structures since such a simple average would not reflect the degree to which each individual's beliefs are considered when making strategic decisions within the TMT of a firm.

Walsh and Fahey (1986) propose that both the content of cognitive beliefs and the degree of influence of individual members are relevant to the decisions that are ultimately made by a group such as a TMT. They suggest that the interplay between the two factors results in a negotiated belief structure, which is the collective knowledge structure upon which the group will base its decision (Walsh and Fahey, 1986; Walsh *et al.*, 1988). In an empirical test of Walsh and Fahey's (1986) model, Walsh *et al.* (1988) used a weighting system representing the degree of influence of each team member to develop a team-level aggregate of individual-level beliefs.

We use an approach similar to the one employed by Walsh *et al.* (1988) in this study. For each of our three measures of complexity in strategic group structures, we constructed a team-level measure of complexity using a weighted average of the individual-level complexity measures. The weights used in the calculation reflected the degree of influence that each respondent had over a range of strategic decisions.

#### *Degree of influence measure*

The degree of influence of respondents on broad categories of strategic decisions was self-assessed using a four-item, seven point Likert-type scale. The scale and the first three items were used in a study of power within TMTs conducted by Finkelstein (1992). The fourth item was added to account for strategic decisions that are especially relevant to the banking industry. The four items addressed influence regarding issues of resource allocations, organization redesigns, growth and acquisition planning, and new service development and introductions. The degree of influence of each respondent within the TMT was calculated by adding the individual's scores on all four items and dividing by the grand sum of the scores across the four items for all TMT members. The result was a proportion of decision-making influence within the team possessed by the individual respondent. This proportion was then applied to each of the cognitive group complexity measures calculated for an individual to appropriately weight his or her knowledge structure during the calculation of the team average.

#### *Control variables*

We included several control variables to account for environmental and firm characteristics that may influence the relationship between the complexity in knowledge structures and firm performance. First, we included dummy variables to control for differences in firm performance that could be attributed to regional effects. Since our sample is drawn from three metropolitan areas, we include two city indicator variables in our analysis. The parameter estimates for the city indicator variables will reflect the effects from a range of differences across these regions, including issues such as market munificence, volatility, and concentration.

We also included four control variables in our analyses that identify differences in physical firm attributes: type of bank, size of bank, and two variables representing slack resources available to the organization. The profit potential of the bank and the knowledge structures of managers may be influenced by the type of legal entity of the bank. Thus, we included a variable for the type of bank, using a dummy variable indicating if the bank was a commercial or savings bank. Also, we included a variable for firm size to control

for issues related to market power. We measured size of the bank using total deposits in millions of dollars. Finally, we included two variables to measure the slack resources available to the bank. Slack resources have been argued to play multiple roles in organizations (Cheng and Kesner, 1997). First, organizational slack may influence the likelihood that managers will perceive the need to reassess their knowledge structures, as slack serves as a buffer insulating the organization from environmental pressures and challenges (Thompson, 1967; Garud and Van de Ven, 1992).<sup>3</sup> Additionally, the availability of slack resources will influence the ability of firms to implement desired actions as organizational slack may represent a pool of unused assets that can be drawn upon during times of organizational change (Cyert and March, 1963; Bateman and Zeithaml, 1989). Consistent with earlier research on the effect of slack on organizational action (e.g., Singh, 1986), we included measures for absorbed and unabsoberd slack resources. Unabsorbed slack was measured using the percentage of total assets in core capital. This variable measures the cushion available within the organization to absorb losses before depositor's funds are impaired and represents resources that can be employed almost immediately to either meet challenges or exploit opportunities. Absorbed slack was measured by the ratio of net overhead expenses to average assets. It measures the slack resources that have been absorbed into the cost structure of the firm.

Finally, we included two control variables to control for the degree to which there was consistency within the TMT regarding the knowledge

structures identified. We wanted to control for the level of agreement about the competitive environment since this could influence the ability of the team to communicate effectively in formulating firm strategy as well as the breadth of perspective that exists within the team. First, we measured the level of consensus within the team regarding the basic type of strategic group taxonomy identified. Two coders independently reviewed the strategies identified by each respondent and identified the fundamental dimension on which the respondent based his or her taxonomy. The taxonomies were coded as focusing primarily on the product lines of the banks, the dimensions on which banks differentiated themselves (e.g., service, technology, or cost), the size of the banks, or their relative positioning in response to industry consolidation/deregulation. Interrater reliability using Cohen's kappa (Cohen, 1960) was  $k = 0.7724$ ,  $p < 0.0001$ . The magnitude of the statistic suggests that there was a substantial level of agreement between coders (Landis and Koch, 1977). We constructed the team-level consensus variable by measuring the proportion of dyad of managers within a team that used the same type of taxonomy. Second, the level of consistency among team members in the firms coded was measured as the degree of overlap in the firms coded. We first calculated the overlap for each dyad of managers within a team by dividing the number of banks with which both respondents were familiar by the total number of banks coded by the respondents combined. In other words, we divided the intersection of their knowledge structures by the union of their structures. We then calculated a team variable by averaging across all of the dyads within the team.

### *Subsequent firm performance*

The measure of subsequent performance used in this study was average Return on Average Assets (ROA) for the years 1995 and 1996. We chose ROA as our performance indicator for several reasons. First, this measure is the most frequently used measure of performance in management studies of the banking industry (Reger, Duhaime, and Stimpert, 1992; Reger and Huff, 1993; Deephouse, 1996, 1999; Mehra, 1996) as well as finance studies of this industry (Gilbert, 1984; Gorton and Rosen, 1995). Second, it is consistently used in the

<sup>3</sup> In our primary analysis, we do not include prior performance of the firm as a control variable. Based on prior research regarding the nature of knowledge structures (e.g., Porac *et al.*, 1989; Reger and Palmer, 1996; Hodgkinson, 1997), we concluded that knowledge structures are fairly stable and resistant to change. If these knowledge structures are stable entities, any effect the knowledge structure will have on firm performance is likely to be sustained as opposed to transient. Consequently, we believe it is appropriate to test for stable effects on firm performance as opposed to changes in firm performance. At the same time, we understand that many researchers believe that it is desirable to control for firm performance in such situations to more fully determine the causality of relationships. Therefore, we conducted an additional analysis in which we included the prior performance (ROA) of the firm over the 2 years preceding the time period in which we collected the perceptual data. The results from this analysis are consistent with those presented in the paper, although the explanatory value of these results is somewhat lower than with our primary analyses (incremental adjusted  $R^2$  associated with the hypothesized variables declined from 0.12 to 0.09).

banking industry for internal assessment of business unit profitability and for external assessment of the performance of bank holding companies. Third, Sheshunoff Information Services, a widely respected industry analysis firm, describes ROA as the best indicator of earnings efficiency. We also conducted analyses using operating profit margin as a dependent variable and found that the results were consistent with the results for ROA. The profitability figures were collected from three annual volumes published by Sheshunoff: Banks of Colorado, Banks of Minnesota, and Banks of Wisconsin. The information in these volumes is taken from financial reports that all banks are required to submit to the Federal Reserve.

### Analytic methods

Hierarchical linear regression was used to test the hypotheses in this study. In the first analysis, we entered the control variables. Second, we tested the effects of the 'base' complexity variables: the weighted averages of the number of strategies identified and number of competitors categorized. Third, we added the squared terms for the two base variables to check for curvilinear relationships. In our final analysis, we removed the squared variables and added the integrative variable of average group size, representing a structural dimension of cognitive group complexity. This variable is composed of effects of both the number of strategies identified and the number of competitors categorized. Since this variable is calculated as a ratio of the two base complexity variables, it was treated similarly to an interaction variable in the analyses. In order to ease the representation and interpretation of the parameter estimates, all of the independent variables were standardized with a mean value of 0 and standard deviation of 1.

## RESULTS

Table 1 presents the means, standard deviations, and correlations for the variables tested in this model. Not surprisingly, several of the independent variables are significantly correlated. Specifically, both the number of strategies identified and number of firms categorized are significantly correlated with the average group size. This result is due to the construction of the variables. Similarly,

the squared complexity variables are highly correlated with their base terms. However, we control for this in our regression analysis by standardizing the base terms before we square them. Since we were concerned about issues of multicollinearity among the other independent variables, we calculated variance inflation factors (VIF) in each of the regression equations. Since all of the variance inflation factors within the linear model are below 10, we concluded that multicollinearity is not a significant problem in our analyses (Neter, Wasserman, and Kutner, 1990). In order to test for violations in the assumptions of OLS regression, we used plots to examine for heteroskedasticity in the data, calculated the externally studentized residuals for each of the observations to test for outliers, and calculated Cook's *D* values for each of the observations to identify possible influential observations. All of these examinations indicated that the data were consistent with the underlying assumptions of the OLS model.

The results of the hierarchical linear regression analysis for the team-level knowledge structures are reported in Table 2. As expected, the control variables had a significant effect on performance of the firms, with an adjusted  $R^2$  of 0.36 ( $F = 6.33$ ,  $p < 0.01$ ). There are clearly systematic differences in the profitability of banks across the regions, with the Twin Cities and Denver banks significantly outperforming the Milwaukee banks. Additionally, the firm-level characteristics are consistent with our expectations. Commercial banks outperformed savings banks ( $p < 0.01$ ). We also saw positive performance implications related to the size of the bank ( $p < 0.10$ ) and the level of slack resources available to the firm ( $p < 0.05$ ). Somewhat surprisingly, the degree of similarity in the strategic taxonomies identified and firms coded within TMTs appeared to have no effect on the performance of the firm.

Next we added the base complexity variables to the model, finding that they significantly increased our ability to explain firm performance ( $F = 5.24$ ,  $p < 0.05$ ). Interestingly, the weighted average of the number of strategies identified by the TMT was significantly *negatively* related to firm performance ( $p < 0.01$ ), contrary to Hypothesis 1. Firms performed better when the number of strategies identified by the TMT were fewer, suggesting that a cognitively manageable classification of competitor strategies was more predictive of firm performance than in-depth differentiation of strategic

Table 1. Descriptive statistics and correlations

Variable		Mean	S.D.	Deviation	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. ROA		1.31	0.47															
2. Number of strategies listed		5.11	1.15	-0.26														
3. Number of firms coded		23.86	5.25	-0.03	0.24													
4. Number of strategies listed squared		27.46	12.13	-0.21	0.99	0.25												
5. Number of firms coded squared		596.52	236.07	-0.05	0.23	0.99	0.24											
6. Average group size		5.23	1.95	0.31	-0.59	0.47	-0.56	0.46										
7. Degree of overlap in firms coded		0.70	0.12	-0.07	0.24	0.50	0.25	0.57	0.09									
8. Consensus in taxonomy type		0.59	0.39	-0.01	0.11	0.02	0.09	0.04	-0.18	0.13								
9. Type of bank		0.06	0.24	-0.52	-0.03	0.24	-0.03	0.26	0.12	0.35	-0.06							
10. Size of bank		537.08	1741.00	0.11	-0.08	0.06	-0.08	0.05	0.08	-0.01	-0.11	-0.06						
11. Unabsorbed slack		9.12	2.50	-0.06	-0.26	0.04	-0.25	0.05	0.43	0.03	-0.16	0.41	-0.13					
12. Absorbed slack		2.51	0.71	0.25	0.16	0.01	0.14	-0.02	-0.09	-0.06	-0.04	-0.37	-0.40	-0.39				
13. Indicator variable for the Twin Cities		0.48	0.50	0.19	0.13	-0.12	0.12	-0.12	-0.23	-0.01	-0.07	-0.24	0.06	-0.23	0.16			
14. Indicator variable for Denver		0.26	0.44	0.29	-0.15	-0.06	-0.14	-0.08	0.20	-0.01	-0.03	-0.15	0.11	0.04	-0.57			
15. Indicator variable for Milwaukee		0.26	0.44	-0.52	0.00	0.20	-0.00	0.22	0.07	-0.02	0.11	0.42	-0.07	0.16	-0.24	-0.57	-0.34	

If  $r \geq 0.19$  then  $p < 0.10$ ; if  $r \geq 0.22$  then  $p < 0.05$ ; if  $r \geq 0.30$  then  $p < 0.01$

Table 2. Effect of cognitive structures of the top management team members on firm performance

Variables	Control variables only	With basic complexity variables	With squared complexity variables	With integrated complexity variables
Intercept	1.31** (0.04)	1.30** (0.04)	1.25** (0.05)	1.30** (0.04)
Number of strategies listed		-0.14** (0.05)	-0.14** (0.04)	0.00 (0.07)
Number of firms coded		0.07 <sup>†</sup> (0.04)	0.03 (0.06)	-0.07 (0.08)
Number of strategies listed squared			0.09** (0.03)	
Number of firms coded squared			-0.03 (0.04)	
Average group size				0.21* (0.09)
Degree of overlap in firms coded	0.03 (0.05)	0.03 (0.05)	0.05 (0.06)	0.04 (0.05)
Degree of consensus in taxonomy type	0.02 (0.05)	0.02 (0.05)	0.04 (0.05)	0.04 (0.05)
Type of bank	-0.17** (0.05)	-0.18** (0.05)	-0.16** (0.05)	-0.15** (0.05)
Size of bank	0.08 <sup>†</sup> (0.05)	0.06 (0.05)	0.08* (0.05)	0.05 (0.05)
Unabsorbed slack	0.11* (0.06)	0.06 (0.05)	0.07 (0.05)	0.00 (0.06)
Absorbed slack	0.10* (0.06)	0.09 <sup>†</sup> (0.06)	0.13* (0.06)	0.07 (0.06)
Indicator variable for the Twin Cities	0.15** (0.06)	0.16** (0.05)	0.15** (0.06)	0.17** (0.06)
Indicator variable for Denver	0.18** (0.06)	0.17** (0.06)	0.16** (0.05)	0.15** (0.06)
<i>F</i>	6.33**	6.76**	6.85**	7.01**
Incremental <i>F</i>		5.24*	4.06*	5.13*
Adjusted <i>R</i> <sup>2</sup>	0.36	0.43	0.48	0.47

*N* = 76; <sup>†</sup> *p* < 0.10; \* *p* < 0.05; \*\* *p* < 0.01; using one-tailed tests

Note: standard error terms appear in parentheses

categories. Hypothesis 2 was modestly supported, with the weighted average of the number of competitors categorized having a marginally significant effect (*p* < 0.10) on firm performance.

Our third analysis includes the squared terms for the two complexity dimensions. Contrary to Hypothesis 3, the results suggest that firms at the extreme end of the scales in the number of strategies identified performed better than firms identifying a moderate number of strategies. The base term for the number of strategies is negative and significant (*p* < 0.01), while the squared term is positive and significant (*p* < 0.01). Further examination indicates that firms with the fewest number of strategies identified (two standard deviations below average) could expect to have an ROA value of around 1.9, assuming they are average on all other

attributes. In contrast, firms whose teams identified the greatest number of strategies (two standard deviations above average) could expect to have an ROA of approximately 1.3, which is not much above the ROA level at the inflection point of the curve (approximately 1.2) and still slightly below the average performance for all banks in the sample (1.31). Thus, the results are inconsistent with the shape predicted in Hypothesis 3. The results suggest that the best-performing firms identify the fewest number of strategies, but that the negative effects associated with increasing complexity on this dimension bottom out and rise slightly near the extreme end of the distribution. Also, inconsistent with Hypothesis 4, we find no significant effects for either the base or squared terms for the number of firms coded.

In our final analysis, we replaced the squared measures with the integrative measure of average group size. The incremental  $F$ -statistic for the team-level analysis indicates that inclusion of this variable added significantly to the explanatory value of the model ( $F = 5.13$ ,  $p < 0.05$ ). Further, consistent with Hypothesis 5, the parameter estimate was positive ( $p < 0.05$ ). Average group size and firm performance were positively related. This supports the idea that the firms that were more cognitively focused on having a relatively high degree of familiarity with their competitors' strategies, but categorized these firms into broader strategic types, performed better. Further, the individual main effect of the number of strategies identified on firm performance became insignificant when the interactive effect of the two base variables was added to the model. These results suggest that the structure of knowledge sets has important influence on the value of those sets. Thus, it is not only important to examine the level of complexity on different dimensions of managerial knowledge structures but also to investigate the way in which information is structured within those knowledge sets.

### **Additional analyses**

In addition to our primary analyses, we conducted an additional set of analyses that focused solely on the knowledge structure of the CEO. Given the centrality of the CEO in strategy research and strategic decision making (e.g., Priem, 1992; Dollinger, Golden, and Saxton, 1997) as well as the difficulties associated with developing collective knowledge structures, we wanted to assess the consistency of the results when viewing the knowledge structures from the perspective of the CEO. Compared to the primary analyses, the results from the additional CEO analyses were consistent, although slightly less explanatory (see Table 3). The same pattern of relationships was evident in the data, but the incremental  $R^2$  explained by the hypothesized variables decreased from 0.12 to 0.10.

We found the comparability of results between the TMT analyses and CEO-only analyses fairly unsurprising given that the CEO was typically the most influential member of the TMT, having on average 40 percent greater influence than the next most influential team member. Consequently, the team-level knowledge structure was typically more

reflective of the knowledge structure of the CEO than any other TMT member. Furthermore, there was a fairly high level of consistency in the structures identified within the teams, as seen in the mean values for the overlap and consensus variables reported in Table 1, so we expected results from the CEO to mirror those from the full TMT.

### **DISCUSSION AND CONCLUSIONS**

According to Daft and Weick (1984), the TMT bears the responsibility for determining the way in which an organization interprets the environment and responds to it strategically. If TMTs use cognitive groupings of competitors to make decisions regarding their firms' strategic actions, as suggested by Porac *et al.* (1989) and Porac and Thomas (1990), then assessing the appropriate level of complexity of these groupings may be important to drawing conclusions about managers' effectiveness in surveying and interpreting their competitive landscape. It is important, therefore, to gain an understanding of how top managers view their competitive landscapes since it presents an opportunity to assess the relative effectiveness of their interpretative mental models. Determining the nature of cognitive groupings of competitors is a window into the knowledge structures used by TMT members to interpret strategically relevant data from their environments. This study takes a first step towards understanding how complexity of mental models may differ between TMTs and how these varying levels of complexity may be related to subsequent performance of their firms.

Our initial finding, from both the linear and curvilinear analyses, indicates that the best-performing firms identified the fewest number of strategies in their market. This finding suggests that a more generalized categorization of strategies by the team within its market is beneficial. However, the level of strategy differentiation no longer predicts firm performance when it is evaluated in relation to managers' familiarity with their competitors' strategic activities. In examining the effects of our integrated cognitive group complexity variable, we found that the average size of the cognitive strategic groups held by the TMT was positively related to subsequent performance.

We can characterize the type of knowledge structure associated with financial success as one of mixed complexity. Firms performed better when

Table 3. Effect of the CEO's cognitive structure on return on assets

Variables	Control variables only	With basic complexity variables	With squared complexity variables	With integrated complexity variables
Intercept	1.31** (0.04)	1.31** (0.04)	1.25** (0.06)	1.31** (0.04)
Number of strategies listed		-0.12** (0.04)	-0.08* (0.04)	0.00 (0.08)
Number of firms coded		0.07* (0.04)	0.04 (0.05)	-0.03 (0.07)
Number of strategies listed squared			0.09* (0.03)	
Number of firms coded squared			-0.03 (0.04)	
Average group size				0.16† (0.10)
Type of bank	-0.16** (0.05)	-0.17** (0.05)	-0.17** (0.05)	-0.17** (0.05)
Size of bank	0.08† (0.05)	0.06† (0.04)	0.09* (0.05)	0.07† (0.04)
Unabsorbed slack	0.09* (0.05)	0.08† (0.05)	0.09* (0.05)	0.08† (0.05)
Absorbed slack	0.10† (0.06)	0.09† (0.06)	0.10 (0.06)	0.08† (0.06)
Indicator variable for the Twin Cities	0.15** (0.06)	0.15** (0.06)	0.14** (0.05)	0.14** (0.05)
Indicator variable for Denver	0.19** (0.06)	0.17** (0.05)	0.17** (0.05)	0.16** (0.05)
F	8.50**	8.57**	7.63**	8.10**
Incremental F		5.46*	2.43†	2.65
Adjusted R <sup>2</sup>	0.37	0.44	0.47	0.46

N = 76; † p < 0.10; \* p < 0.05; \*\* p < 0.01; using one-tailed tests

Note: standard error terms appear in parentheses

the mental models of their top managers encompassed a cognitively manageable number of strategic categories, with the contents of their categories containing, on average, a sufficiently large number of competitors to indicate that the managers had a thorough knowledge of their competitive marketplace. This finding suggests that the key issue is for top managers to focus on general positioning of their potential competitors. One potential implication is that oversegmentation of the market may lead to inferior performance as the organization may underestimate the level of competitive threat from rivals they have placed into other competitive niches or possibly ignore market opportunities that are seen as outside of their current market niche.

Our findings are compatible with previous research that identifies the importance of effective perceptual filters that allow TMTs to focus their attention on the matters of most relevance and importance, even if the accuracy of their

information is not perfect (Starbuck and Milliken, 1988). Consequently, the results indicate that in order to understand the strategic value of managers' knowledge structures, researchers need to examine not only the amount of information held within these structures but also the distribution of cognitive attention and the resulting organization of managerial knowledge.

Our results are also consistent with prior individual-level research which indicates that performance is related to level of expertise and that experts in a domain have knowledge structures that contain fewer categories than novices, but have more items within each category (Hershey *et al.*, 1990; Lurigio and Carroll, 1985; Sujan *et al.*, 1988). Our finding that the complexity of TMTs' mental models in more financially successful firms is similar in form to experts' knowledge structures extends our understanding of the potential effects of knowledge structures to the level of the organization.

Furthermore, our results are supportive of the cognitive strategic groups literature in general in that we find that categorization of competitors into manageable sets can have positive effects on firm performance. At the same time, the results bring into question the belief that managers within and across firms hold homogeneous beliefs regarding the competitive structure of their industry, since we find that the degree of complexity in TMTs' mental models varies significantly across firms. Our findings suggest that the manner in which top managers enact their competitive landscape may be a source of competitive advantage for their firms.

An inherent limitation of our research design was our decision to provide a predetermined list of competitors for our respondents to categorize by strategy. In arriving at this decision, we considered allowing respondents to arrive at the names of their competitors in the industry based on a privately generated list of industry participants. However, we were concerned that having managers identify a list of firms could potentially cause two problems. First, we were concerned that we would suffer with a low response rate if we extended the time it would take to complete the survey instrument, as would likely occur if respondents had to develop their own list of industry players. Second, we were concerned that managers would focus primarily on firms they saw as direct competitors in creating their list, rather than the more complete list we were seeking of firms they considered to be part of their industry as a whole. Additionally, we wanted to tie our methodology as closely as possible to prior studies in this domain, several of which supplied respondents with a list of firms to categorize (e.g., Hodgkinson, 1997; Porac *et al.*, 1995; Reger and Huff, 1993; Reger and Palmer, 1996). At the same time, concerns can be raised with the approach we chose. It is probable that respondents, given their own discretion, would have included firms that were not on the list we provided. Future researchers may wish to examine whether a more open-ended method for eliciting strategic group knowledge structures would lead to different results from those found here.

As we noted earlier, the results of supplemental analyses using only the CEOs' knowledge structure variables produced results similar to, but slightly less explanatory than, those using the

entire TMT. There are several possible explanations for the similarity in results. First, it could mean that the CEO is the only TMT member whose viewpoint 'counts' when it comes to evaluating the effects of firms' strategic groupings on firm performance. Perhaps the influence of the balance of the TMT in strategic decision making is, in reality, limited. As we noted before, the CEO's self-reported influence was significantly greater than the other team members' influence. In a similar vein, the CEO's influence could be so overpowering that the knowledge structures of the other TMT members begin to reflect those of the CEO. The third, and perhaps most interesting, possibility is that the knowledge structure of the CEO develops as a composite of the CEO's personal views *plus* those of the TMT as a whole. The generally accepted characterization of the CEO is that he or she is the strategic leader of the firm. If CEOs, in performing this role, solicit and digest the thinking of the other members of the TMT whom they consult on strategic matters, then the viewpoints of their TMTs are likely to be incorporated into the CEOs' own strategic knowledge structures (Calori *et al.*, 1994).

As we mentioned earlier in footnote 1, it may also be instructive for future research to assess the best method for identifying the TMTs of firms. We chose to ask the CEO to identify the top managers of the firm, but much of the research on TMTs uses public statements such as firm proxy filings to identify the top managers of the firm. However, it is not clear to what degree the officers listed in proxy statements represent an accurate and complete list of the managers actively involved in the strategic decision process. We compared the proxy teams with those identified by the CEO for the three publicly traded firms in our sample. The results from this comparison provide very tentative evidence that the teams reported in the proxy statements may only reflect a partial list of the managers actually involved in strategic decision making. Future research should address the issue of the validity of TMTs derived from public statements such as proxy statements by doing a comprehensive comparison of teams identified by CEOs with those identified in the firms' public filings.

In assessing the contribution of our findings to the body of research in the field of strategic cognition, it is pertinent to refer to scholars'

recommendations for accumulating knowledge. In his overview of the literature on managerial and organizational cognition, Walsh (1995) challenges researchers seeking to establish the relationship of TMTs' cognitive beliefs to managerial results to consider several issues. Our study addressed three of Walsh's prescriptions by (1) assessing attributes of managerial knowledge structures related to information regarding the nature of their firms' competition; (2) demonstrating that complexity of strategic group knowledge structures is related to subsequent firm performance, an outcome of value to the organization; and (3) weighting individual-level cognitive group complexity with the amount of influence each member wields in strategic decision making, thereby incorporating the inherently social nature of TMT processes.

## **AREAS OF FUTURE RESEARCH**

Given the findings of the current study and the relatively limited exploration of strategic cognition to date, we believe that the examination of attributes, foundations, and consequences of the strategic knowledge structures of TMTs represents a potentially fruitful research area within the domain of strategic management. Clearly, the general findings here may be specific to the industry setting examined. The banking industry is distinct from many industries in that it is highly regulated, fragmented, and comprises geographically delineated markets. Future research should assess the generalizability of the findings presented here. Additionally, based on our results, the relative influences of CEO knowledge structures vs. those of the TMT as a whole appears to be a fruitful area for further investigation. Such studies might explore how strategic group knowledge structures of CEOs are formed and their similarity to those of their strategic advisors within the TMT. A consideration of the factors that influence similarity between CEO and TMT knowledge structures would be appropriate in conjunction with this area of research. In a related vein, the dynamism of knowledge structures related to strategic groups would be an interesting area for further exploration. To what degree are such knowledge structures stable? What are the factors that cause them to change over time? Researchers could also more directly assess the industry and firm characteristics that affect

the formation and stability of strategic knowledge structures.

In addition, future research should examine other attributes of strategic group knowledge structures, investigating issues such as the asymmetries in the categorization schemes used by managers that may relate either to strategic creativity aimed at redefining the industry or to competitive blind spots in the knowledge structures that could leave organizations vulnerable. Future research could also explore the possibility that classes of firms within industries develop differing conceptualizations of industry structure and how these competing logics could affect industry evolution. Relatively, future studies could enhance our understanding of mental models by examining the relationship between knowledge structures and competitive activities. The examination and comparison of different methodologies for measuring the formation of strategic groups are also a ripe area for further exploration. Perhaps a completely unconstrained approach to identifying strategic group membership would produce results different from those we observed in our study. The nature of strategic group mental models identified using an individualized categorization system might provide new insights into the effects of strategic group knowledge structures on firm outcomes.

These suggested research issues illustrate how little we know about how strategic group knowledge structures affect firm action and performance. To date, much time and energy have been spent identifying, defining, and comparing cognitive strategic groups, but little progress has been made in identifying the characteristics of such grouping structures that affect important firm actions and outcomes such as firm performance. The present study represents an important initial step in addressing this issue by demonstrating that the degree of complexity in the structure of TMTs' cognitive strategic groups is significantly related to their firms' subsequent performance.

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