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THE GENESIS OF STRATEGY IN NEW VENTURES: ESCAPING THE CONSTRAINTS OF FOUNDER AND TEAM KNOWLEDGE

MICHAEL J. FERN,[1]* LAURA B. CARDINAL,[2] and HUGH M. O'NEILL[3]
[1] *FernStrategy, Inc., Santa Clara, California, U.S.A.*
[2] *C. T. Bauer College of Business, University of Houston, Houston, Texas, U.S.A.*
[3] *Kenan-Flagler Business School, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, U.S.A.*

Although an entrepreneur's initial strategy choices have a critical effect on a new venture's survival, growth, and long-term performance, few studies have explored how pre-founding experience influences these choices. Founders who over rely on their historical industry experiences may simply replicate the strategies of legacy firms. In turn, little is known about how founders can break these experience-based constraints, if they exist. In an empirical analysis of 120 prospective entrants in air transportation from 1995–2005 we find that a founder's past experience strongly constrains choices, and the effect depends on the form of experience and type of strategy choice. Diversity of experience, at the level of the founder and founding team, lessens these constraints. Our results have valuable implications for research in strategy and entrepreneurship. Copyright © 2011 John Wiley & Sons, Ltd.

INTRODUCTION

An entrepreneur's initial choices condition and constrain the firm's evolution (Aldrich, 1999; Boeker, 1988; 1989; Cardinal, Sitkin, and Long, 2004; Eisenhardt and Schoonhoven, 1990; Kimberly and Bouchikhi, 1995).[1] However, the genesis of these crucial initial choices—choices that have a significant impact on firm-level outcomes and shape industrywide profits—is not well understood. Theory does not adequately explain why entrepreneurs, confronted with identical industry environments, conceive of different strategy choices.[2]

In this research, we investigate the initial strategy choices of the founder and founding team, building on theories from cognitive and social psychology. We hypothesize that knowledge drawn from an entrepreneur's experience will significantly constrain his or her strategy choices as the new venture is formed. We further posit that diversity of knowledge at the level of the individual and founding team will enable the founder to break these experience-based constraints. In our hypotheses, we explore several forms of knowledge at the individual and team level and examine their linkage to two types of strategic decisions, which are further described below.

We focus on the role of founders' and founding teams' prior experience, rather than on the environment (i.e., competitive, institutional, or technological) or on personality traits, for two primary reasons. First, while the nature of the environment

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* Correspondence to: Michael J. Fern, FernStrategy, Inc., P.O. Box 4364, Santa Clara, CA 95056, U.S.A.
E-mail: michael@fernstrategy.com

[1] Consistent with past research, we use the terms founder and entrepreneur interchangeably.

[2] While there has been some progress in discerning the factors that allow different individuals to perceive different opportunities (e.g., Shane, 2000), few studies explore why individuals select different approaches to exploit these opportunities (see Boeker, 1988 and Beckman, 2006 for notable exceptions).

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can explain founding rates and failures at the industry or population level, it cannot explain why individuals respond differently to the same industry conditions. Second, research on personality traits suggest, at best, a weak correlation between these traits and decision making outcomes (Aldrich, 1999).

The strategy choices that we examine include the product and geographic *markets* (i.e., customer scope) in which the new venture will compete and the form of physical *resources* that the new venture will choose to deliver a product or service within these markets. These strategy elements—markets and resources—comprise two fundamental dimensions of strategy (Porter, 1985; Wernerfelt, 1984).

This research contributes to literature that explores the effects of founders' characteristics on new venture creation (Agarwal *et al*., 2004; Beckman, 2006; Beckman, Burton, and O'Reilly, 2007; Burton, Sorensen, and Beckman, 2002; Gompers, Lerner, and Scharfstein, 2005; Phillips, 2002). Our focus on entrepreneurial experience extends this vein of research by identifying how the founder's experience constrains strategic choices during new venture formation, and how variety in the experience of founders and the founding teams reduces these constraints. In doing this, we draw on cognitive theories to understand the key learning mechanisms that impact entrepreneurial decision making. We connect these multilevel influences (individual and group) to the choice of initial strategy, thus explaining an important source of competitive heterogeneity (Rumelt, Schendel, and Teece, 1995). Our empirical approach enables us to explore these important relationships at a very fine-grained level of detail; our sample, which includes all *prospective* new ventures within a single industry over a 10-year period (i.e., air transportation), avoids the selection bias that plagues many studies that explore entrepreneurial phenomena. Related, our empirical approach allows us to directly assess factors that precede the founding process, rather than rely on respondents' recollections about their pre-founding experiences.

The paper proceeds as follows. First, we briefly review the basic concepts underlying our theoretical arguments. Second, we develop hypotheses for empirical testing. Next, we describe the empirical context, the econometric model, and the results. Finally, we discuss the implications of our findings for management theory and practice.

BACKGROUND

Where do organizations come from?

Organizations emerge from the interplay between entrepreneurs and opportunity (Shane, 2000). According to McMullen and Shepherd (2006), entrepreneurial action is the sequence in which third person opportunities, or factors in the environment, attract attention that triggers first person action, or organizational founding. Crucial to both the attention and action stages is the domain-specific knowledge of the entrepreneur, as without knowledge 'one may not even recognize the possibility for action' (McMullen and Shepherd, 2006: 140).

One important source of domain-specific knowledge for founders is their employment experience in previous organizations. For example, Stuart and Sorenson (2003) and Sorensen (2007) showed how employing organizations provide experience and create a supply of entrepreneurs, whose newly created organizations, in turn, inform other potential entrepreneurs about opportunity. This interplay creates a social contagion process that increases the number of organizational foundings (Cattani, Pennings, and Wezel, 2003) and encourages the transfer of specific practices from established organizations to fledgling firms (Agarwal *et al*., 2004).

Successful organizations develop simple and repetitive patterns (Miller *et al*., 1996; Miller and Toulouse, 1998), and attributions about the organization's success 'focus ever more narrowly and exclusively on a few cherished elements of strategy, on one category of activity' (Miller *et al*., 1996: 864). In turn, a future founder's experience in a particular function or in an organization leads to the formation of recipes or knowledge structures (Lurigio and Carroll, 1985). To the extent that the entrepreneurs' knowledge structures that were developed in previous organizations shape their perceptions and behavior, the founders tend to repeat their learned behaviors, in a process akin to cloning. This myopic learning increases the pressures that eventually become codified as institutional practices, and may lead to industrial homogeneity. The stronger the influence of past experience, the more likely it is that a population of organizations will copy practices of the past (Miller and Toulouse, 1998). This learning logic is economical, and can lead to effective performance in supportive environments.

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From observing populations of organizations, we know that heterogeneity does occur (Cattani *et al*., 2003). One source of heterogeneity could emerge when founders arrive from outside the industry. These entrepreneurs lack the experience of incumbents, and therefore may act differently than entrants who have had substantial experience in the industry. A second source of heterogeneity in the selection of strategy occurs among entrants with experience in established firms, if the links to experience are nonbinding.[3] When and how do the links to experience become less binding? Our study focuses on this second source of heterogeneity.

The degree to which founders draw on their experience will be related to the founders' knowledge structures. Fiske and Dyer (1985) suggested that a well-formed knowledge structure, or schema, develops in stages. Strong links between components in a schema might trigger cloning behavior, while weak links might trigger novel behavior that encourages heterogeneity. While indirect evidence suggests similarities among entrepreneurs' schemas (Corbett and Hmieleski, 2007; Sorenson, 2007), individual patterns are unlikely to be identical. Indeed, just as exploitation and exploration may characterize established companies (March, 1991), so too they may describe the behavior among entrepreneurs creating new firms. However, as Shane (2000) and Gruber (2009) noted in their studies of entrepreneurs, few founders demonstrate knowledge of any choices other than the one choice they make. Their choices seem to overemphasize exploitation (which relies on their past experience) and underemphasize exploration (which involves search beyond their own experience).

To this point, all our arguments have been based on individual learning. Entrepreneurial action can also be a social process, as founders incorporate the experiences of others into their own knowledge structure. Beckman (2006), for example, found that unique experiences among founding team members trigger exploratory rather than exploitative forms of learning. Similarly, Miller *et al*. (1996) found that the presence of 'outsiders' triggered an expansionary search for strategies. The founding team, then, can trigger exploratory learning and reduce the path dependency between entrepreneurs' previous experience and their founding choices. Few studies have explored the links between founder and founding team experience and strategy choice, or the difference in the strength of links across different types of experience and choices.

The choice of strategy

To describe the entrepreneur's choice, we draw on the notion of strategy, defined by Chandler (1962: 14) as 'the adoption of courses of action and the allocation of resources necessary for carrying out these goals.' We further define strategic actions by distinguishing between two content dimensions (Spanos and Lioukas, 2001) that appear prominently in the literature: the firm's market position (Porter, 1985) and the firm's stock of resources (Barney, 1991; Wernerfelt, 1984). In our study, position refers to the prospective products or services to be produced (i.e., product market choices) and the geographic location (i.e., geographic market choices) in which these products or services will be offered. As our measure of resources, we focus on the physical asset chosen to provide the service.[4]

The role of experience-based knowledge

The central explanatory variable in this research is the prior industry experience of the entrepreneur and the founding team. To understand how individual-level experience affects choice, we turn to the cognitive psychology literature, and the concept of an individual's knowledge structure. A knowledge structure is defined as a 'cognitive structure that represents knowledge about a concept or type of stimulus, including its attributes and the relations among those attributes' (Fiske and Taylor, 1991: 98). Knowledge relevant for a domain increases with experience in that domain (Howell, 1973; Lurigio and Carroll, 1985). A knowledge structure begins as a collection of discrete knowledge components; relationships and linkages between these components form with additional experience. As individuals' experience

[3] New ventures are predominately founded by entrepreneurs separating from former employers, or as spin-offs from established organizations, as is the case for our sample of firms.

[4] Drawing on our empirical context of air transportation, examples include: for product market choice, providing cargo or vacation charter service; for geographic market choice, offering services in New England or the Southwest region of the United States; and for physical resource choice, selecting regional turboprop or narrow body jet aircraft.

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increases, they acquire more knowledge components and establish more linkages between them, and their knowledge structure moves from a simple to a more integrated state. In this way, content knowledge becomes more structured and, in concert, future choices become more path- dependent.[5]

In many decision making situations, individuals face almost an infinite set of options. Because individuals are cognitively constrained (March and Simon, 1958), they cannot contemplate all possible options and their consequences, and they likely consider only those options contiguous to their past experiences. Specifically, the knowledge structure of individuals delimits the types of choices they are able to make when faced with a decision task (Butler and Sherer, 1997; Ward, 2004). Individuals often exploit their existing knowledge rather than explore new options, even in contexts so altered that this knowledge is no longer sufficient to make a high quality decision (Wiley, 1998). If entrepreneurs draw on their experience-based knowledge structures (e.g., knowledge of customers, suppliers, geography, technology, equipment, and industry best practices) during the planning stages of venture development, then a relationship between the entrepreneurs' experience and their choice of strategy is expected. Our task is to distinguish factors in entrepreneurs' experience that constrain choice from those factors that break these constraints.

HYPOTHESES DEVELOPMENT

Our hypotheses delineate the features of an entrepreneur's experience-based knowledge structure that underlie differences in decision outcomes. The founder's experience and individual-level knowledge structures may lead to narrowly constrained choices whereby the decision choice duplicates past experience. We suggest that factors that will increase the exploitation of past experience include the founder's knowledge accessibility and the commonalities in the knowledge of the founding team. In contrast, variety in the entrepreneur's experience and unique experiences in the founding team will decrease the constraints of the past experience and increase exploratory behavior.

The links between experience and founder choices

The most basic factor influencing decision making is the knowledge available in memory (Baldwin *et al*., 1996; Higgins, 1996). As Ward (2004: 176) remarked, '[c]reative ideas do not appear... full-blown in the minds of their originators, but rather must be crafted from the person's existing knowledge.' Research suggests that the most influential knowledge within a person's memory is obtained through firsthand experience (Baldwin *et al*., 1996). Given the evidence that an individual's decisions are often constrained by memories drawn from experience, we propose that the same effect holds for decision making during new venture formation.

The constraints of knowledge accessibility

When individuals face a decision task, they draw on knowledge held in memory. Specific knowledge use hinges on its current accessibility to the decision maker. Several different models of knowledge accessibility have been proposed (e.g., Smith and DeCoster, 1998; Srull and Wyer, 1989) and each share a central feature: accessibility is a function of whether knowledge has been primed in memory by its prior use.[6] Accordingly, a central factor in the accessibility of knowledge is how frequently that knowledge has been activated or used (DeCoster and Claypool, 2004).

This general notion of frequency can be made more precise by considering the different dimensions that comprise an individual's knowledge structure. The social cognition literature distinguishes between two dimensions of knowledge: a content dimension and a structural dimension (Fiske and Dyer, 1985; Fiske and Taylor, 1991; Hayes-Roth, 1977). Content knowledge refers to discrete knowledge about a concept or stimulus, which increases with experience (Howell, 1973; Lurigio and Carroll, 1985; Walsh, 1995); structural knowledge consists of knowledge about the

[5] Experience affects both knowledge about choices and affords access to complements to those choices, such as contacts (professional and social networks) within a chosen market. We use experience as a proxy for knowledge, as is the case in previous research (Reber, 1989; Shane, 2000; Smith and DeCoster, 1998; Wiley, 1998). We do not directly measure other direct effects of experience, such as access to contacts, nor do we assess other forms of knowledge, such as that learned through specific training or formal education.

[6] The effects of priming have also been studied in the literatures on recall and recognition (Rubin and Wenzel, 1996) and heuristics (Tversky and Kahneman, 1974).

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relationships between different knowledge components and relates to the sequencing, association, or linkage between concepts or stimuli.

As entrepreneurs increase their cumulative experience with a specific strategy element (e.g., product and geographic markets, or resources) they develop greater content knowledge about that element. For example, an entrepreneur in the air transportation industry will develop greater knowledge about competing in a particular geographic market (e.g., layout of airports, regional competitors, regional laws and regulations, etc.) with additional exposure within that market. When faced with making a strategic decision for a new venture, an entrepreneur will draw on content knowledge that is readily accessible in his or her memory, where accessibility is a function of cumulative experience. Therefore, we propose the following hypothesis:

Hypothesis 1a: An entrepreneur is more likely to select a product market, geographic market, or resource as his/her experience with that market or resource increases.

Entrepreneurs develop greater structural knowledge about strategy elements through exposure to those elements in different contexts. As an individual acquires more knowledge components and establishes more linkages between components, his or her knowledge structure develops. For instance, an entrepreneur in the air transportation industry may be exposed to the New England geographic market across three separate firms. In each firm, the entrepreneur gains knowledge about the critical aspects of the New England geographic market and, moreover, how this geographic market relates to different organizational and other contextual dimensions. When entrepreneurs select a strategy for a new venture, they will likely select a strategy that draws on their more developed structural knowledge. Thus, we propose the following hypothesis:

Hypothesis 1b: An entrepreneur is more likely to select a product market, geographic market, or resource as his/her experience with that market or resource in different organizations increases.

Although we expect that both the founder's content and structural knowledge will influence decision making during new venture formation, we anticipate that structural knowledge will be more influential than content knowledge. Although little research explicitly addresses this relationship, findings do indicate that individuals acquire knowledge more quickly by performing a variety of related problem solving tasks than by repeating a single task (Reber, 1989; Schilling *et al*., 2003). These findings support the idea that individuals are likely to develop more integrative knowledge structures (i.e., structural knowledge) from exposure to related concepts in multiple contexts.

In turn, as a founder performs a task in an increased variety of contexts, the founder's ability to perform the task likely improves, if evidence from similar learning contexts (Bingham, Eisenhardt, and Furr, 2007; Narayanan, Balasubramanian, and Swaminathan, 2009) can be generalized to founders. Founder experience in differing contexts leads to a reinforcement process that strengthens skills. In turn, the increased skill leads to increased confidence to extend the skill to similar contexts. This experience-based learning is tacit in nature. Through reinforcement, choices become automatic.

We propose that structural knowledge will be especially influential for strategic decision making during new venture formation. These well-developed knowledge structures are acquired by experiencing a product market, geographic market, or resource in multiple contexts, and thus learning not only about a market or resource but also about their relation to other contextual variables. Practice variation leads to success, which builds structural knowledge that is instinctively extended to other contexts. Therefore,

Hypothesis 1c: The effect of structural knowledge on the choice of a product market, geographic market, or resource will be significantly greater than the effect of content knowledge on this choice.

The recency of knowledge priming has also been shown to influence the degree to which knowledge is accessible during decision making (Higgins, 1996; Higgins, Bargh, and Lombardi, 1985; Rubin and Wenzel, 1996; Srull and Wyer, 1979). Although recency effects have largely been explored in experimental settings, they have also been observed in autobiographical research (see Rubin and Wenzel, 1996 for a review). For

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instance, in a 20-year study on recall about 'real-world' events, Catal and Fitzgerald (2004) found that knowledge retention is a function of the time elapsed since the autobiographical event occurred. By extension, the recency of an entrepreneur's specific knowledge acquisition will affect the degree to which he or she can access that knowledge. Empirical evidence (e.g., Anderson and Schooler, 1991; Rubin, 1982) indicates that knowledge decay occurs quite rapidly within the first few years, but then levels off over time. Hence,

> *Hypothesis 2: An entrepreneur is more likely to choose a product market, geographic market, or resource if his/her experience with that market or resource is more recent; as time passes, the effect of knowledge on strategy selection will decay rapidly at first and then level off over time.*

Breaking constraints through knowledge variety

In the previous subsection, we developed hypotheses that argue entrepreneurs will draw on their existing knowledge when selecting a strategy during new venture formation. This knowledge builds directly on the practices of an existing firm. In effect, then, the entrepreneur has a tendency to imitate the choices of a past employer. This tendency to build on the past can present problems. For instance, consider an entrepreneur who leaves a legacy firm to start a new venture within the same industry, at a time when the industry is undergoing fundamental change. The entrepreneur is likely to imitate some strategy elements of the legacy firm that are incongruent with the emerging industry environment. The dilemma is that an entrepreneur requires certain knowledge elements to compete with an industry, but this requisite knowledge may significantly bind the entrepreneur's decision making and lead to calamity. This tendency is consistent with research that suggests the vast majority of new entrants simply imitate the existing practices of incumbent firms and most founding attempts fail (Aldrich, 1999).

On the upside, a few entrepreneurs generate novel practices that deviate substantially from prevailing approaches. Research from the creativity literature suggests that inventive thinking depends on associating components within memory into new combinations (e.g., Mednick, 1962; Mumford and Gustafson, 1988; Ward, 2004); the more distant the components that make up the combination, the more innovative the solution.

The literature on cognitive complexity also illuminates the conditions that foster creative insight. Cognitive complexity, or an individual's 'capacity to construe social behavior in a multidimensional way' (Bieri, 1966: 185), enables 'differentiation—the ability to perceive several dimensions in a stimulus array—and integration—the development of complex connections among the differentiated characteristics' (Bartunek, Gordon, and Weathersby, 1983: 274). Individuals with greater cognitive complexity will consider a greater number of options in their decision making before committing to a single approach (Goodwin and Ziegler, 1998). Entrepreneurs whose knowledge spans problem domains will have greater opportunity to recombine knowledge elements and derive solutions that deviate from past ways of doing things (Higgins, 1996; Ward, 2004). For example, Gruber (2009) measured breadth of work experience across industrial domains (e.g., retail, manufacturing, service, etc.) and found that broad domain experience increased the variety of options considered at entry. Here, we measure variety of experience within a single industry, and test how that variety affects the link between past experience and actual strategy choices.

Entrepreneurs with experience in a limited number of domains may have few strategic options to choose from. In contrast, entrepreneurs with a breadth of domain experience will be less constrained by any single past experience. In short, an entrepreneur will be less likely to select a specific strategy element if he or she possesses knowledge of alternative elements. Therefore,

> *Hypothesis 3: An entrepreneur is less likely to select a particular product market, geographic market, or resource if he/she possesses knowledge of alternative markets or resources.*

The experience of the founding team

Many studies of entrepreneurship overlook a conspicuous feature of new ventures; namely, that many ventures are started by collaborative teams that possess a diversity of skills and experiences. As such, Ensley and colleagues remarked, 'the success of a venture is often a reflection of its team's ability to meld talent and ability in a creative and

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coordinated fashion' (Ensley, Pearson, and Amason, 2002: 365–366). A founding team exists when two or more members actively participate in the establishment of a new venture in which they hold an equity interest (Watson, Ponthieu, and Critelli, 1995).

These small teams are best described as hierarchical teams with distributed expertise (see Hollenbeck *et al*., 1995). A lead entrepreneur is ultimately responsible for arbitrating strategic decisions (i.e., the prospective chief executive officer [CEO] or president), but members of the team (e.g., chief operating officer, vice president of business development) provide significant input into the decision making process.[7] Because team members have different experiences, members often possess different knowledge about strategy elements (i.e., product markets, geographic markets, and/or resources) (Larson, Foster-Fishman, and Keys, 1994). Thus, an understanding of the antecedents of strategy in new ventures requires a better appreciation for how ideas may emerge from team members' interactions.

If team members influence each other during the decision making process, then we would expect the lead entrepreneur's decision making to reflect the entire team's knowledge. This relationship between team knowledge and the lead entrepreneur's decision making can be made more precise by drawing on findings from research in social psychology that highlight the importance of shared (Kerr and Tindale, 2003; Stasser and Titus, 1985) and unique knowledge (Dugosh *et al*., 2000; Milliken and Martins, 1996).

The constraints of common experience

Members within teams tend to focus on information that is common among group members (Stasser and Titus, 1985). Research suggests that four processes underlie how preferences based on common experiences emerge during group decision making (Kerr and Tindale, 2003). First, if group discussion is viewed as a process of 'knowledge sampling,' then any commonly held experience-based knowledge is more likely to be sampled vis-à-vis experience that is held by only one member. Second, groups often suspend their discussion before exhausting all possible information held by members. Groups may first discuss insight based on common experience, reach early consensus, and suspend further discussion before unique knowledge is adequately debated. Third, individuals prefer to share and receive common experience and knowledge because it demonstrates their competence and legitimacy. Lastly, individuals prefer to defend their initial position rather than accept an alternative advocated by others. If shared opinions are expressed first, the tendency to defend initial positions will decrease the chances that alternatives emerge. Because teams tend to discuss shared more than unique experience, shared experience will likely influence the decision outcome. We would expect that an entrepreneur is more likely to select a strategy element that reflects the team's shared experience and represents a tie to the team's collective past. Therefore,

> *Hypothesis 4a: An entrepreneur is more likely to select a product market, geographic market, or resource if the entrepreneur and the founding team possess shared experience with that market or resource.*

Breaking constraints through unique experience

Although some scholars argue that teams are more likely to attend to common rather than unique experience during decision making, we suspect that unique experience-based knowledge held by the minority could be influential as well. Team members who possess unique knowledge may be able to stimulate the decision making of other members (Brown *et al*., 1998; Dugosh *et al*., 2000; Simonton, 2003), a phenomenon that introduces new insight into the decision process and thus fosters the consideration of new options.

In the minority dissent literature, scholars have found that individuals respond to minority positions by embracing multiple perspectives, searching for new information, and identifying new solutions outside their initial position (De Dreu and West, 2001; Gruenfeld, Thomas-Hunt, and Kim, 1998; Nemeth, 1986). The brainstorming literature finds that group diversity affects creative thinking (McGrath, 1984), although the results are mixed (McGlynn *et al*., 2004). In brainstorming groups, each individual first presents knowledge to the group that is most easily accessible, followed

[7] Consistent with the argument that a lead entrepreneur tends to govern decision making in new ventures, Jones and Butler (1992) noted that entrepreneurs have a difficult time switching to management roles in corporations that require balancing the different interests of other owners.

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by knowledge that is less accessible, until the individual has no more ideas to present (Dugosh *et al*., 2000). As an individual hears the ideas of others in the brainstorming group, latent knowledge may be activated. Thus, individuals participating in group discussions may engage ideas that they would have not considered had they contemplated the decision task alone. Several studies in the top management team literature report similar findings. The consensus in this research is that group diversity along various dimensions, such as age and background, is critical for innovative and high quality decision making (Jackson, 1996).

Thus, knowledge held uniquely by individual members will have important effects on the decision making process. If unique knowledge is influential, then we would expect the entrepreneur's decisions to reflect specific aspects of this unique knowledge. To the extent that this knowledge is different from the entrepreneur's, incorporating this knowledge may result in a decision that deviates from the entrepreneur's past. Hence,

Hypothesis 4b: An entrepreneur is more likely to select a product market, geographic market, or resource if one or more members of the founding team possess unique experience with that market or resource.

Unique knowledge may play a special role in the decision making process during new venture formation due to the position of founders and the features of an entrepreneurial context. First, founding team members hold an equity interest in the new venture and often a key role on the team. Their perspective is that of owner agents rather than managerial caretakers. Because of their roles, founding team members are more likely to take an active role in the decision making process. Groups with members who actively participate are more likely to incorporate dissenting ideas even when they diverge from the majority view (De Dreu and West, 2001). Second, new venture formation is more akin to decision making in a context of innovation and change, where the focus is on creating something new, and possibly breaking away from the status quo. The innovativeness of the context can influence the degree to which team members are willing to incorporate divergent and conflicting opinions into their decision making (Wood *et al*., 1994).

In sum, while common and unique knowledge among the founder and team will influence the decision making process, unique knowledge held by team members will likely be especially influential in the context of new venture formation. Thus, we propose the following hypothesis:

Hypothesis 4c: The effect of unique knowledge on the choice of a product market, geographic market, or resource will be significantly greater than the effect of shared knowledge on this choice.

METHODOLOGY

The empirical context

The empirical context for this research encompasses the U.S. air transportation industry (Standard Industrial Classification [SIC] major code 45) from January 1995 to June 2005. This study focuses on three segments of the commercial air transportation industry: (1) air transportation scheduled (SIC code 4512), (2) air courier services (SIC code 4513), and (3) air transportation nonscheduled (SIC code 4522).[8] Since the U.S. Airline Deregulation Act of 1976, the air transportation industry has become fragmented and competitive. From 1978–2005 at least 588 new carriers received authorization from the U.S. Department of Transportation (DOT) to operate in the industry, with 329 large scheduled passenger carriers, 171 charter and cargo carriers, and 88 commuter carriers (U.S. Department of Transportation, 2005b).

Sample

The sample for this study includes the population of prospective new entrants in all three segments of the air transportation industry during the period January 1995 through June 2005.[9] Air taxi operators, a division of the nonscheduled segment, are

[8] General aviation, which is not included, encompasses all 'civil aviation operations other than those air carriers holding a Certificate of Public Convenience and Necessity. Types of aircraft used in general aviation range from corporate, multi-engine jets piloted by a professional crew to amateur-built, single-engine, piston-driven, acrobatic planes' (Bureau of Transportation Statistics, 2006).

[9] While a majority of our sample included *de novo* ventures, the sample also contained *de alio* entrants. An example of a *de alio* entrant was a small aircraft maintenance company that is seeking to become a vacation charter carrier.

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not included because data on these firms were not available. The initial list of 160 new entrants was compiled by reviewing every application for a 'Certificate of Economic Authority' submitted to the DOT. The initial list of 160 applicants, which included both large aircraft and commuter entrants, was further condensed because some of the applicants were not characteristic of 'new entrants.' After eliminating these applicants from the initial sample, we arrived at a sample of 120 new entrants.[10]

Sources of data

Applications for economic authority

The principal source of data was the aforementioned 'Applications for Economic Authority' submitted to the DOT. Applications submitted to the DOT must contain comprehensive information regarding the applicant's corporate structure and ownership, management expertise and technical ability, and financial position and operating plans (U.S. Department of Transportation, 2005a). Using parts of this information, augmented with data from other sources, we developed the database for the analysis.

We first identified the founder and members of the founding team. Following past research in entrepreneurship, we considered individuals on the founding team if they actively participated during the formation stage and held an equity interest in the prospective new venture (Watson *et al*., 1995). The information about equity interests was complemented by two additional pieces of information to identify the lead entrepreneur. Each application contained a short narrative, which often indicated the name of the lead entrepreneur. The application also contained resumes that indicated the titles of those on the founding team (e.g., CEO, president) and the date at which the individuals joined the new venture. By reviewing these three sources (i.e., equity interests, the narrative, and the resumes), and in some cases triangulating across these sources, we were able to clearly identify the lead entrepreneur from others on the founding team.

Next, using the resumes of the founder and the founding team, we identified all aviation-related and aviation-unrelated employment experiences. For each employment record, we noted the precise years in which the work experience occurred. Because the resumes listed any positions that individuals in authority held at air transportation companies, we were able to consult *The Airline Encyclopedia* (Smith, 2002) for detailed information about each company to develop the independent variables pertaining to knowledge. Specifically, the independent variables pertaining to knowledge were constructed by identifying the product markets, geographic markets, and physical resources (i.e., aircraft) associated with each air transportation company in which each founder and founding team member had prior work experience.

For the dependent variables pertaining to choice of product market, geographic market, or resource we used the operating plans concerning the new carrier that were contained in these DOT applications. A further description of these strategy choices is provided below.

The last source of data encompassed the aviation support tables available from the Bureau of Transportation Statistics. These support tables provide basic aircraft characteristics (e.g., maximum speed, payload, seating capacity). We used these aircraft characteristics to cluster aircraft into categories (e.g., wide body jet, regional turboprop, light aircraft) for the dependent variable for resources.

Operationalization of variables

Dependent variables

The three dependent variables relating to strategy used in this study are the choices made with respect to (1) product market, (2) geographic market, and (3) resources (Porter, 1985; Wernerfelt, 1984).

First, for *product market*, seven distinct product markets were identified: (1) ACMI,[11] (2) all-cargo, (3) executive charters, (4) vacation charters, (5) premium scheduled, (6) low cost scheduled,

[10] Firms were excluded for the following reasons: firms were missing data for either the independent or dependent variables (N = 10), firms reapplied for authority after bankruptcy proceedings (N = 8), firms not required to file for authority and misapplied (N = 5), firms that reapplied several years after withdrawing their initial application (N = 3), established airlines that planned to provide service using a new entity to negotiate new union contracts (N = 7), firms that planned to transfer their existing authority to other parties (N = 6), and a firm that planned to start an airline to service its own employees and cargo needs (N = 1).

[11] Under an ACMI (aircraft, crew, maintenance, and insurance) agreement, a company leases an aircraft, including crew, maintenance, and insurance, to other companies and charges by hours of service.

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and (7) regional commuter. Second, for *geographic market*, nine distinct geographic markets were identified: (1) New England, (2) Mid-Atlantic, (3) South, (4) Midwest, (5) Southwest, (6) West, (7) Canada and Alaska,[12] (8) Mexico and the Caribbean, and (9) all other international destinations. Third, for *resources*, we focused on the class of aircraft selected, with aircraft representing a physical resource. Seven distinct classes of aircraft were identified: (1) light aircraft, (2) regional turboprop, (3) regional/business jet, (4) narrow body jet, (5) wide body jet, (6) rotary wing (helicopters), and (7) medium piston.

Each dependent variable is binary, set to 1 if that element was selected and set to 0 otherwise. For instance, for resource, if the founder selected only light aircraft, the dependent variable was set to 1 for light aircraft and 0 otherwise. This construction of the dependent variable is characteristic of a conditional logit model (McFadden, 1974), which is further described below.

Independent variables

Each independent variable in the model is linked to the dependent variable in the sense that each explanatory variable is developed by assessing the founder's work experience with a particular product market, geographic market, or resource. For instance, when examining the choice of product market, a set of independent variables are constructed that explore the founder's prior work experience with each of the seven possible product markets indicated above.

We measured work experience as a source of knowledge. Prior research in psychology has shown that domain experience is strongly related to knowledge development and, furthermore, firsthand experience (e.g., work experience) is particularly influential (Baldwin *et al*., 1996).

Six independent variables were constructed to test the hypotheses. *Content knowledge* was assessed using a count variable that tallied the cumulative number of years the founder had prior work experience with a product market, geographic market, or resource. *Structural knowledge* was measured by tallying the number of previous jobs that the founder held where he or she had experience with these strategy elements. *Knowledge recency* was assessed using a count variable that tallied the time elapsed in years since the founder had work experience with these strategy elements. This variable was then transformed using a power function (Rubin and Wenzel, 1996):

$$y = b \times t^{-m} \quad (1)$$

Knowledge variety was measured using a count variable that tallied the number of product markets, geographic markets, or resources in which the founder had prior work experience.[13]

Two team-level variables were included to assess the effect of team members on the founder's decision process. The first variable, *shared knowledge*, was a binary variable and was set to 1 if the founder and any of the team members had a shared work experience with a product market, geographic market, or resource, otherwise this variable was set to 0. *Unique knowledge* was measured using a binary variable as well, which equaled 1 if any of the team members had a unique work experience that the founder lacked.

Control variables

We included one variable in the empirical analysis, *number of prior entrants*, to control for the founding team's possible imitation of the strategy choices of other entrants (DiMaggio and Powell, 1983).[14] This control was a count variable that measured the cumulative number of previous new entrants that selected a product market, geographic market, or resource within the 12 months preceding the entry of the focal new venture.[15]

[12] Canada and Alaska were grouped into a single region since few carriers planned entry into Canada; the few that did also planned to serve Alaska.

[13] We also explored two additional measures of knowledge variety used in past research on intrapersonal diversity (Bunderson and Sutcliffe, 2002; Walsh, 1988). These other measures for knowledge variety did not show significance in our statistical analysis, further highlighting the tenuous relationship between the variety of work experience and the choice of market or resource.

[14] We acknowledge that this control variable may pick up other factors other than imitation, such as factors in the environment that cause new ventures entering within the same time period to select a similar market or resource. We note, however, that we did explore several additional control variables, including a control variable for the 9/11 attacks, to assess the impact of time effects on strategy choices (see Footnote 15). This additional control variable did not exhibit a statistically significant relationship with strategy choices. This is noteworthy given how the 9/11 attacks transformed the environment in which airlines operated.

[15] We also explored several additional control variables. As noted above, we investigated a time dummy to control for

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Analysis

The founder's decision of selecting a strategy element given a finite set of choices can be assessed using a conditional logit (McFadden, 1974; Greene 1990). A conditional logit allows for models with multiple alternatives, and variables that vary across alternatives given the heterogeneity of subjects in the sample. It is ideally suited for studying heterogeneous decision making (Greve, 2000), which is of central concern in this research. The method has been used to study decisions covering a range of choices, such as geographic choices (Alcacer and Chung, 2007), supplier choices (Hoetker, 2006), and partner choices (Jensen and Roy, 2008). In the conditional logit model, the probability that individual i selects alternative j is given by the following equation (Greene, 1990):

$$P(Y_i = j) = \frac{e^{\beta' x_{ij}}}{\sum_{j=1}^{J} e^{\beta' x_{ij}}} \quad (2)$$

where *Xij* denotes a vector of values regarding attributes of choice j given person i, and $j = 1, 2, \ldots,$ J where J equals the total number of choice alternatives.

As with all methods, the conditional logit has several limitations that warrant attention. Foremost, the conditional logit is not well suited for examining variables that vary by subject, but do not vary given different choices (e.g., founder age). While it is possible to include variables that vary by subject, it requires the inclusion of a number of interaction terms, which uses up precious degrees of freedom. This limitation of the conditional logit accounts for the paucity of control variables included in the final empirical model reported in this study.

The second limitation of the conditional logit is that it assumes the alternatives under consideration are not close substitutes. This assumption is termed the independence of irrelevant alternatives (IIA). Violations of IIA can result in estimation biases and thus lead to erroneous interpretations of the results (Hausman and McFadden, 1984). Although violations of IIA are a possible concern, we believe the choices used in this study correspond to alternatives that 'can plausibly be assumed to be distinct and weighed independently in the eyes of each decision-maker' (McFadden, 1974: 113). To confirm our conceptual understanding, we tested for violations of the IIA assumption (Greene, 1990). We found no violations in the case of product market and geographic market choice, but did observe several violations for resource choice.[16] To assess the significance of these violations, we reran the analysis after excluding the resource choices that triggered the violations. There were no substantive changes in the results for the remaining choices included in the model. This suggests our results for resource choice are robust.

EMPIRICAL RESULTS

Overview of the data

Of the 120 new entrants in the sample, only six included founders that lacked previous direct air transportation experience (6/120 = 5% of the sample). Of these six, three involved founding team members with extensive air transportation experience and two included founders or founding team members that had aviation-related prior experience. Tables 1a, 1b, and 1c provide descriptive statistics and a correlation matrix for the data. Despite the relatively high correlations between select variables, a reanalysis of the data with each dependent variable, when excluding these correlated variables, did not yield significantly different results. Further, an examination of variance inflation factors across the three sets of data suggested that multicolinearity was not cause for concern.

time period effects, particularly to account for the effect of the 9/11 attacks on the airline industry. We constructed a dummy variable that was set to 1 if the plan was submitted to the DOT after September 11, 2001 and set to 0 otherwise. Second, we explored two controls for aviation-related experience, for example, experience working at an aircraft manufacturer, rather than at an airline. One control was a count of the founder's total number of years at aviation-related companies and the second was a count of the number of jobs at different aviation-related companies. Third, we investigated two controls for non-aviation experience. One control was a count of the founder's total number of years at non-aviation companies and the second was a count of the number of jobs at different non-aviation companies. In the final analysis, we excluded the aforementioned control variables because they did not have substantive affects on the results, and they used important degrees of freedom.

[16] In particular, regional turboprops and regional jets yielded a violation because these two choices can be considered viable alternatives on certain short-haul routes. Similarly, regional/business jets and narrow body jets yielded a violation because these two aircraft choices can be considered viable alternatives on certain medium-haul routes.

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Table 1a. Descriptive statistics and correlation matrix of product market data

		Mean	s.d.	1	2	3	4	5	6	7
1	Product market choice	0.14	0.35							
	Founder									
2	Content knowledge	2.02	5.52	0.38						
3	Structural knowledge	0.33	0.80	0.41	0.69					
4	Knowledge recency	0.11	0.31	0.41	0.64	0.67				
5	Knowledge variety	0.47	1.01	0.26	0.56	0.69	0.53			
	Team									
6	Shared knowledge	0.07	0.25	0.26	0.37	0.43	0.51	0.36		
7	Unique knowledge	0.08	0.27	0.03	−0.11	−0.12	−0.11	−0.14	−0.08	
	Other									
8	Number of prior entrants	1.57	1.63	0.19	0.14	0.14	0.11	0.14	0.06	0.05

n = 120; all correlation coefficients with a magnitude of over 0.07 are significant at the 0.05 level.

Table 1b. Descriptive statistics and correlation matrix of geographic market data

		Mean	s.d.	1	2	3	4	5	6	7
1	Geographic market choice	0.22	0.42							
	Founder									
2	Content knowledge	2.81	5.96	0.35						
3	Structural knowledge	0.52	0.97	0.38	0.70					
4	Knowledge recency	0.16	0.36	0.36	0.53	0.59				
5	Knowledge variety	1.46	2.52	0.25	0.57	0.66	0.44			
	Team									
6	Shared knowledge	0.12	0.32	0.26	0.37	0.46	0.41	0.44		
7	Unique knowledge	0.08	0.28	0.02	−0.14	−0.16	−0.13	−0.18	−0.11	
	Other									
8	Number of prior entrants	2.41	2.29	0.21	0.14	0.13	0.14	0.12	0.09	0.04

n = 120; all correlation coefficients with a magnitude of over 0.07 are significant at the 0.05 level.

Table 1c. Descriptive statistics and correlation matrix of resource data

		Mean	s.d.	1	2	3	4	5	6	7
1	Resource choice	0.15	0.35							
	Founder									
2	Content knowledge	3.82	7.84	0.28						
3	Structural knowledge	0.58	1.01	0.45	0.67					
4	Knowledge recency	0.16	0.36	0.41	0.56	0.63				
5	Knowledge variety	1.07	1.64	0.26	0.61	0.69	0.49			
	Team									
6	Shared knowledge	0.12	0.33	0.26	0.41	0.42	0.46	0.42		
7	Unique knowledge	0.06	0.24	0.00	−0.13	−0.15	−0.12	−0.17	−0.10	
	Other									
8	Number of prior entrants	1.58	2.77	0.42	0.25	0.32	0.21	0.19	0.21	−0.04

n = 120; All correlation coefficients with a magnitude of over 0.07 are significant at the 0.05 level.

Results of the conditional logit

In Table 2, we present the results of the conditional logit analysis with choice of product market, geographic market, and resource as the dependent variables, respectively. For each dependent variable, the variables were entered hierarchically to assess the value of adding the controls and subsequently the covariates by examining the decrease in log-likelihood between each model. A test of the change in log-likelihood was conducted by comparing the change in the log-likelihood to

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Table 2. Final results of conditional logit model of product market, geographic market, and resource choice

Variable	Model		
	Product market choice	Geographic market choice	Resource choice
Number of prior entrants	0.17*	0.08	0.04
Founder			
Knowledge accessibility			
Content knowledge	0.03	0.04	−0.08**
Structural knowledge	0.38	0.64***	0.80**
Knowledge recency	0.75†	1.43***	1.48**
Knowledge variety			
Knowledge variety	1.72**	−0.09	−0.93
Knowledge variety^2	−0.50**	0.03	0.30
Team			
Shared knowledge	0.50	1.28**	0.44
Unique knowledge	1.66***	1.43**	2.18**
R^2	0.35	0.33	0.52
Log-likelihood	153.11	249.20	112.48
Δ Log-likelihood	5.39**	5.19**	4.45*
d.f.	14	18	14
Choices	840	1041	840
New entrants	120	116	120

R^2 calculated using McFadden's method; † $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

a chi-square distribution using the appropriate degrees of freedom for each comparison, where the degrees of freedom correspond to the additional parameters in each model.

To conserve space, Table 2 presents the final results of the full model for each dependent variable. The full set of stepwise results is available from the authors.

For each dependent variable, we first tested the unconditional model with the control variable, number of prior entrants. In each analysis, the model is highly significant ($p < 0.001$). The control variable, number of prior entrants, is significant in two of the three models (product market, 0.16, $p < 0.01$; geographic market, 0.10, $p < 0.05$).

For each dependent variable (i.e., product market, geographic market, and resource), we then added the variables to assess the role of experience-based content knowledge, structural knowledge, and knowledge recency. The change in log-likelihood from the unconditional model (including the control variable) is highly significant (product market, 53.19, $p < 0.001$; geographic market, 94.98, $p < 0.001$; resource 43.73, $p < 0.001$). Next, we found that content knowledge has a significant and positive effect for just one (i.e., product market) of the three dependent variables (0.05, $p < 0.10$). For geographic market, the coefficient for content knowledge is nonsignificant; for resource, the coefficient is significant but negative (−0.05, $p < 0.05$). The surprising disparity in the results provides inconclusive evidence for Hypothesis 1a.

Consistent with Hypothesis 1b, structural knowledge had a significant positive effect across all three dependent variables, product market (0.53, $p < 0.05$), geographic market (0.68, $p < 0.001$), and resource (0.83, $p < 0.001$).

To test Hypothesis 1c, which compares the effects of content and structural knowledge, we performed a Wald test on the difference between the coefficients for content knowledge and structural knowledge. As predicted, the effect of structural knowledge is significantly greater than the effect of content knowledge for product market ($X^2 = 13.33$, $p < 0.001$), geographic market ($X^2 = 10.35$, $p < 0.001$), and resource ($X^2 = 13.30$, $p < 0.001$).

Hypothesis 2, which addresses knowledge recency, is supported across the three dependent variables. The coefficient for knowledge recency is significant and positive for product market (1.24, $p < 0.01$), geographic market (1.55, $p < 0.001$), and resource (1.64, $p < 0.001$). Further, as hypothesized, the effect of knowledge recency on the choice of product market, geographic market, and resource decays rapidly at first and then levels off over time, which is demonstrated by plotting the

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predicted probability of making a specific choice against knowledge recency.[17]

When we include the variables related to knowledge variety, there is a significant improvement in the log-likelihood for just one of the three dependent variables: product market ($p < 0.05$). The effect of knowledge variety was tested by including a squared term. Recall, Hypothesis 3 suggested that a founder is significantly less likely to select a specific strategy element if he or she possesses knowledge of alternative elements. The empirical results are consistent with this hypothesis only for product market: the main effect for knowledge variety is significant and positive and the squared term of knowledge variety is significant and negative (-0.044, $p<0.05$). This indicates that entrepreneurs are less likely to select a specific product market as their knowledge variety in product markets increases beyond a threshold level.

Finally, we introduced the team-level variables. The change in the log-likelihood across all three dependent variables indicated a significant improvement in model fit (product market, $p < 0.01$; geographic market, $p < 0.01$; resource, $p < 0.05$). The coefficient for shared knowledge is positive and significant for only one of the three dependent variables: geographic market (1.28, $p < 0.01$). This provides partial support for Hypothesis 4a. Providing strong support for Hypothesis 4b, however, the coefficient for unique knowledge is significant and positive for all three dependent variables: product market (1.66, $p < 0.001$), geographic market (1.43, $p < 0.01$), and resource (2.18, $p < 0.01$). To test Hypothesis 4c, which compares the influence of shared and unique knowledge, we performed a Wald test on the difference between the coefficients. The difference test revealed support for Hypothesis 4c for two of the three dependent variables: product market ($X^2 = 3.29$, $p < 0.10$) and resource ($X^2 = 5.67$, $p < 0.05$).

Looking at the total predictive power of the three models, we can see that the final models for the three dependent variables (i.e., product market, geographic market, resource) predicted 35 percent, 33 percent, and 52 percent of the variance, respectively. This represents an improvement of 27 percent, 26 percent, and 21 percent over the baseline models. The model with product market choice as the dependent variable correctly predicted 64 of the 120 product choices (53%). The model with geographic market choice as the dependent variable correctly predicted 121 out of 242 geographic market choices (50%). Finally, the model with resource choice as the dependent variable correctly predicted 83 of the 120 resource choices (69%).

CONCLUSION

This study investigated how founder experience constrains strategy choices during new venture formation, and how variation in experience of the founder and the founding team might break these constraints. Drawing on theories from cognitive and social psychology, we developed several hypotheses that relate the founder's accumulation of experience in similar contexts, recent experience, and variety in experience to strategy choice. We also developed hypotheses that propose how shared and unique knowledge held by the founding team affects the founder's decision outcomes. The sample for the empirical analysis consisted of 120 prospective new entrants in the air transportation industry, during the period 1995–2005. The hypotheses were tested using a conditional logit model. Table 3 provides a summary of the hypotheses and empirical results.

The results from the empirical analysis revealed several key insights regarding the origin of strategy in new ventures. First, despite the prevalence of research that stresses the role of industry practices in the determination of a new venture's entry strategies (the control variable *number of prior entrants*), we found that the effects of structural knowledge and knowledge recency on strategy choice were significantly greater than the effects of imitative tendencies. This result suggests that decision makers are more likely to exploit the knowledge gained from their own experience rather than explore the practices of competing firms when selecting a strategy for their new organizations. This finding is consistent with work that notes that entrepreneurs rarely search for novel solutions, where novel implies something different than their past experience (Gruber, 2009). This finding is also consistent with research that shows that business planning at the initial stages of a firm's operation actually hurts performance (Dencker, Gruber, and Shah, 2009). The negative link observed between planning and performance by Dencker and colleagues, which runs counter to normative theories

[17] This plot is not included due to space limitations.

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Table 3. Summary of empirical results

Hypothesis	Product market choice	Geographic market choice	Resource choice	Overall support
Founder's knowledge accessibility:				
H1a. An entrepreneur is more likely to select a product market, geographic market, or resource as his/her experience with that market or resource increases.	0.05†	0.04	−0.05*	Inconclusive
H1b. An entrepreneur is more likely to select a product market, geographic market, or resource as his/her experience with that market or resource in different organizations increases.	0.53*	0.68***	0.83***	Strong
H1c. The effect of structural knowledge on the choice of a product market, geographic market, or resource will be significantly greater than the effect of content knowledge on this choice.	Dif: 13.30***	Dif: 10.35**	Dif: 13.30***	Strong
H2. An entrepreneur is more likely to choose a product market, geographic market, or resource if his/her experience with that market or resource is more recent; as time passes, the effect of knowledge on strategy selection will decay rapidly at first and then level off over time.	1.24**	1.55***	1.64***	Strong
Founder's knowledge variety:				
H3. An entrepreneur is less likely to select a particular product market, geographic market, or resource if he/she possesses knowledge of alternative markets or resources.	−0.44**	0.03	0.07	Partial
Founding team's knowledge:				
H4a. An entrepreneur is more likely to select a product market, geographic market, or resource if the entrepreneur and the founding team possess shared experience with that market or resource.	0.50	1.28**	0.44	Partial
H4b. An entrepreneur is more likely to select a product market, geographic market, or resource if one or more members of the founding team possess unique experience with that market or resource.	1.66***	1.43**	2.18**	Strong
H4c. The effect of unique knowledge on the choice of a product market, geographic market, or resource will be significantly greater than the effect of shared knowledge on this choice.	Dif: 3.29†	Dif: 0.01	Dif: 5.67*	Partial

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

of planning (Miller and Cardinal, 1994), may occur because the planning entrepreneur overly relies on his or her past experience, and that past experience fails to account for changes in the environment. Further research is necessary to understand how frequently prescribed practices such as planning might hinder entrepreneurs from moving beyond their existing experiences, and when constraints of experience have detrimental impacts on new venture success.

Second, we found that certain features of knowledge were much more influential than others. In particular, entrepreneurs were biased toward choices consistent with structural knowledge (i.e., knowledge accrued through practice variation) and recently acquired knowledge.[18] The longer-term

[18] A counterintuitive finding was that the choice of resource (i.e., type of aircraft) was negatively related to content knowledge. This negative effect may reflect founders desire to 'graduate' to larger, more complex aircraft over time, as they advance in

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impacts of each of these biases deserve further attention. Bingham and colleagues (2007), in a study of decisions after firm founding, note that the relationship between practice variation (which leads to structural knowledge) and the ability to take advantage of entrepreneurial opportunities is nonlinear. The extended practice of knowledge across time and task can lead to unquestioned and tacit acceptance of the nature of that knowledge. The application of tacit knowledge can lead to learning myopia (Levinthal and March, 1993), and the founders/founding teams may fall into competence traps. Similarly, recently acquired knowledge may trigger a form of response based on fashion rather than response based on cognitive understanding. Founders can act without reflecting on their experience, and the lack of reflection causes incomplete understanding of the task at hand. Reflective learning, in contrast, leads to a deeper understanding of how to make the firm successful. While there has been theoretical and empirical work on how managers in established organizations might engage in insightful inquiry (Senge, 1990; Mitroff and Linstone, 1993), there has been limited attention paid to the challenges of learning at the pre-founding stage.

Third, this research suggests that as experience extends across strategy choices, it becomes less constraining, but only in the case of product market experience. The constraining effect of geographic or resource experience is not remedied through variety in founder experience. This result is partially consistent with research that suggests that entrepreneurs who possess a breadth of knowledge (i.e., generalists rather than specialists) are more thoughtful decision makers (Lazear, 2004). The differentiated pattern in the results aligns with Danneels (2002) notion that forms of path dependency found in studies of technology might not extend to all types of experience. Given the range of decision tasks that a founder faces, a better understanding of the types of experience that do and do not lead to constraints, and which constraints can be remedied through variety, may make new founding less risky.

Lastly, the founding team's knowledge had significant effects on the founder's decision process. With respect to shared knowledge, this variable was significant only for geographic choice. In contrast, unique knowledge held by founding team members strongly influenced the founder's decision outcomes for all decision types. This finding runs somewhat counter to research in social psychology that stresses that team members converge around shared knowledge rather than unique knowledge during team decision making (Kerr and Tindale, 2003; Stasser and Titus, 1985). We suspect that often a strategic choice determines the formation of these groups. While some group members are chosen because they share the past experience of the founder, others are chosen to extend the experience of the founder. Their unique perspectives then prove influential by increasing the chances of exploration. This study cannot retrospectively address how these founding teams were formed. The impact of the founding team members with unique experience may have occurred due to an intentional choice by the founder, or the impact might have been unanticipated and emergent. It is possible that both types of processes (intentional and emergent) occur. Investigations of each of these two paths to breaking the constraints of experience would enhance our understanding of new venture creation.

Implications

This research sheds light on a fundamental research question in strategic management: 'why are firms different?' (Rumelt *et al.*, 1995: 225). Much of the research that addresses this question in management research has adopted economic or sociological perspectives and examines how firms evolve over time (Helfat and Lieberman, 2002, is a notable exception). A confluence of research, however, argues that because of path-dependent effects, initial choices are paramount in a firm's long-term behavior. If this is the case, an explanation of why firms are different requires the examination of factors preceding business formation. Our study suggests differences may emerge due to the heterogeneous knowledge stock (i.e., how the founders vary in their background experience) and the founder's resultant decision making about strategy choices.

A related important question is, 'why are firms profitable?' or its extension, 'why are firms

their aviation careers. This follows the career progression of many commercial pilots, beginning their training in light, single engine aircraft (e.g., Cessna 172) and progressing to increasingly sophisticated aircraft over time as they accumulate additional flight experience. This negative effect might also indicate that it may be easier to make choices that diverge from codified knowledge, as aircraft are a well-known, established technology.

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unprofitable?' (Barney, 1991). While we cannot answer these questions directly from this sample, the dynamics of the emergence of founders from the established population of firms seems to provide a clue. Founders may focus narrowly on the markets and resources used by their previous employers, thereby increasing the number of firms doing the same thing. Unless the rate of growth in demand exceeds the growth in supply, industry profits will likely decline over time. Entrepreneurs who are capable of snapping the ties of past experience (i.e., those with a variety of product market experiences, or those leading teams that possess a diversity of market and resource experiences) may be best positioned for choosing novel options, which may be less damaging to levels of profitability at the firm- and industry-levels.

This research also has important implications for research in entrepreneurial decision making. Thus far, most scholarship on entrepreneurship has focused on firms during their early years of operation and, thus, likely overlooks the critical constraints of pre-founding experience and learning that form the seed of a new venture's evolution and long-term prospects. Our work, in conjunction with other entrepreneurship research (e.g., Beckman, 2006, Shane, 2000; Shane and Khurana, 2003), suggests that a founder's experience has a central influence on new venture formation and outcomes that may surpass the effects of other variables (e.g., economic or sociological).

While we found that several core findings from the social cognition literature can be generalized to entrepreneurial decision making, we discovered several anomalies. For instance, content knowledge in one area (geography) had little or no effect on decision making, while in another area (resource) the effect was opposite expectations. Moreover, structural knowledge (or experience across multiple contexts) was especially important. This suggests that as individuals learn tasks across different contexts, strongly formed ties to the specific task-related practices develop. If movement across contexts increases expertise, the increased expertise may ultimately lead to less exploration of options outside of the decision maker's experience base. An important unresolved question, for example, concerns the trade-offs between the increased skill that accrues from application across context and the increased dependency on that skill.

Moving beyond the individual-level of analysis, our research also demonstrates the importance of the team-level in entrepreneurial decision making. In the context of new venture formation, we found that the unique knowledge of team members is particularly influential. Our finding that unique knowledge had a more dominant impact vis-à-vis shared knowledge runs counter to the social psychology literature. This distinct finding might be extended to other organizations where team members who hold top management positions and have equity interest are likely deeply involved in the decision making process. Although unique knowledge may be especially influential at the early stages of team decision making, it is possible that this knowledge gradually becomes shared over time and can create its own inertial effects. A study of the dynamics of norm forming in newly created entrepreneurial teams, and similar team settings, would be a natural extension of the work presented here.

For practitioners, this research has significant implications for competitive intelligence, new venture team formation, and venture capital funding. Our findings suggest that an entrepreneur's work background is likely to be a significant indicator of the firm's competitive moves. A focal firm that can anticipate the possible actions of a competing firm by analyzing the top management team's background can significantly improve its chances of successful preemption. This research also can be used to help entrepreneurs avoid significant biases in their decision making, particularly among long-time industry workers. To avoid these biases, entrepreneurs should draw on a variety of knowledge sources, including the unique knowledge of potential team members. In addition, this research provides insights on how prospective investors can systematically evaluate whether entrepreneurs are constrained by their work background, to help them avoid significant bias in their decision making. For example, an investor may insist that the entrepreneur take on additional team members who bring distinctive knowledge.

Extensions and discussion

Our research opens interesting avenues for future research. Whereas we examined the effects of knowledge on strategy choice in air transportation, a highly technical industry in which a vast majority of the entrepreneurs have substantial work experience, less technical industries may be more open to entrepreneurs who lack industry-specific

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knowledge and whose past experience may be less influential in the decision making process. In this case, mimetic forces may play a much more significant role, where entrepreneurs make decisions based on the decisions of competing firms in the same industry.

Air transportation is also a fairly mature industry, which has experienced few dramatic effects on its evolution during the timeframe of our sample (i.e., 1995–2005), with the exception of the 9/11 attacks. Thus, a further avenue of research is to examine decision making in nascent high technology industries, where few entrepreneurs have prior industry knowledge on which to draw. Studies in newly emerging industries might ask if entrepreneurs draw on knowledge from related industries or perhaps from the basic scientific knowledge that supports the emerging technology within the new industry. Research drawing on theories from psychology may shed further light on the cognitive sources of business innovation (e.g., Tripsas and Gavetti, 2000).

From a methods standpoint, we see significant opportunities to exploit resume data to further study decision making, either in an entrepreneurial or corporate context. Past assessments of knowledge-based variables have been conducted in an experimental setting, or in a very coarse-grained fashion. Although resumes cannot fully describe an individual's knowledge structure, they provide significantly more detail than typical data used in past studies on top management teams. Resume data indicate the type, length, and sequence of work and educational experiences, and thus provide a better indication of an individual's knowledge structure compared to courser-grained data, such as demographic or functional experience data.

As with all studies, we cannot control all sources of variance. While we did try to control for obvious external influences, there are possible unexamined effects across time that might have influenced choices. We encourage future work to further explore the relationship between knowledge, environment change, decision making, and patterns in organization foundings.

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