ADAPTING THE LOOKING GLASS: FACTORS AFFECTING CHANGE IN ENTREPRENEURS' OPPORTUNITY IMAGES

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**Recommended Citation**

Available at: http://digitalknowledge.babson.edu/fer/vol28/iss6/1
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ABSTRACT

Given the importance of the CEO in adapting to a changing environment, and the role that identification of opportunities for change plays in organizational adaptation, with this study we investigate the individual-level cognitive factors that affect change in a CEO’s existing opportunity images. With a sample of 64 presidents/owners/CEOs of technology firms and using an opportunity-based decision-making task, we find that decision makers’ metacognitive resources and perceptions of the environment are related to changes in their opportunity images: metacognitive knowledge and perceived hostility positively related to change, and metacognitive experience and perceived dynamism negatively related to change. These results not only shed light on processes central to entrepreneurship but also on processes relating to the creation of dynamic capabilities—which at their core involve the type of adaptation and change this research investigates.

INTRODUCTION

Change has long been an important topic in both entrepreneurship and the more general management literature. It has been viewed as both a relatively infrequent event for organizations (Romanelli & Tushman, 1994) and as an ever-present aspect of organizational existence (Tsoukas & Chia, 2002). Strategic change is thought to be affected by both organizational and environmental factors (Hrebiniak & Joyce, 1985; Sharfman & Dean, 1997) and has been suggested to be the result of political, organizational and cognitive processes, each affecting the overarching change process (Schwenk, 1989). It has been linked to firm level outcomes such as performance (Smith & Grimm, 1987), organizational survival (Zuniga-Vicente & Vicente-Lorente, 2006), and organizational renewal (Barr, Stimpert, & Huff, 1992). Indeed, strategic change has long been thought to represent an important outcome of strategy formulation and implementation processes (Hutzschenreuter & Kleindienst, 2006).

At its core, strategic change involves adapting and responding to environmental changes and threats (Smith et al., 1987), as well as enabling and pursuing new opportunities (Gioia & Chittipeddi, 1991). Because of a continued need to understand better the role of opportunities in strategic change (Anderson & Nichols, 2007), and because of the unique perspective that entrepreneurship research brings to bear on questions of “why, when, and how opportunities come into existence” (Shane & Venkataraman, 2000: 218), an entrepreneurship-based approach to change can inform the processes whereby organizational and strategic change occur. Indeed, as Lant and Mezias (1990) note, the utilization of entrepreneurial strategies plays an important role in firms’ responses to environmental change. More specifically, the processes underlying starting a
new business and implementing strategic change are similar (Hill & Levenhagen, 1995). Accordingly, in this paper we adopt an entrepreneurship-based approach to investigating strategic change that focuses specifically on the opportunity elements of strategic change.

As previously noted, strategic change involves political (e.g., Kaplan), organizational (e.g., Sharfman et al., 1997) and cognitive (e.g., Barr et al., 1992) processes and perspectives (Schwenk, 1989); and while no one perspective of strategic change can explain it in its entirety, each approach offers unique elements of explanation. Within our paper, we thus also adopt a cognitive, individual-specific perspective to strategic change and do so for three reasons. First, more work is needed to understand the role that individuals play in strategic decision making processes (Hutzschenreuter et al., 2006), beginning with an understanding of how individual decision makers effect strategic change. Second, organizational action is thought to originate in individual cognition regarding how to compete in the current environment (Barr, 1998; Gioia et al., 1991), which supports the central role of individuals (particularly the CEO) in strategic change. Third, investigations of individual decision makers can inform understanding of the effects of cognition on capability in organizations (Tripsas & Gavetti, 2000), which can thereby inform the larger process of strategic adaptation and change.

With this study we therefore investigate the factors that affect change in a CEO’s existing opportunity-based cognitions so that we can better understand the individually relevant processes that impact strategic change. Our study proceeds as follows. We first introduce the importance of opportunity images. We then discuss a set of factors that we hypothesize to change these opportunity images. Next we discuss the methods used to test our hypotheses and present the results. And finally, we discuss the research and practical implications of these results from the perspective of strategic change.

Opportunity Images and Change

Discussing the importance of mental models in strategic change is not new (e.g., Barr et al., 1992). Indeed, it is well documented that changing and uncertain environments require the development of new mental models (Hill et al., 1995; Reger & Palmer, 1996). In our paper, we call these mental models about opportunities: opportunity images. The notion of opportunity images comes from the decision making literature (e.g., Mitchell & Beach, 1990) with images defined to be “information structures, with different kinds of images representing different kinds of information about what the actor is doing, why and how, and what kind of progress is being made” (Mitchell et al., 1990: 7). Like schemas, images are social representations that allow individuals to organize information and act based on that information (Gioia & Poole, 1984).

A premise underlying our investigation is that these social representations form the basis of action (Barr, 1998), which can then result in strategic change and potentially improved performance (Anderson et al., 2007; Thomas, Clark, & Gioia, 1993). In this decision making-to-action progression, an opportunity image is the opportunity-based prototype against which incoming information about opportunities is compared (Gioia et al., 1984: 450; Mitchell et al., 1990: 7). It is this type of pattern recognition that was described by Baron and Ensley (2006) in their work investigating the cognitive frameworks underlying the recognition of new business opportunities. They found that entrepreneurs with greater experience also possess richer and more relevant prototypes.

But when CEO-instigated change is under investigation, and when such strategic change is characterized as “an attempt to change current modes of cognition and action” (Gioia et al., 1991:
433, emphasis added), it would seem that incoming information could also be expected to affect the prototype/image against which the incoming information is being compared. This expectation is supported in previous research which found that in changing environments, firms that successfully renew strategies will change mental models more quickly than firms that are in decline and that such organizational renewal is based on “being able to link environmental change to corporate strategy and to modify that linkage over time” (Barr et al., 1992: 15). One important implication of this research is that flexibility of mental models represents an important capability of organizations because it allows for dynamic shifts in decision makers’ understanding of their situations. Similarly, because investigations of strategic change efforts initially focus on the CEOs mental models (Gioia et al., 1991: 434), understanding how CEOs’ images about opportunities change is important in understanding overall strategic change. Thus, at the core of our investigation is the investigation of the factors that drive change in these images about opportunities.

The approach that we adopt in investigating change in opportunity images is consistent with adaptive views of cognition (e.g., Bogner & Barr, 2000), which focus on the dynamic elements of the decision making-to-action progression. In this perspective, cognition is seen in the interaction of individual thinking and a broader environmental context (Elsbach, Barr, & Hargadon, 2005: 423). This situated view of cognition also provides an underlying rationale for our investigation of the cognitive factors that affect opportunity-based strategic change. Specifically, this situated view of cognition guides us in our focus upon two elements of the individual-environment interaction that are likely to affect changes in opportunity images: (1) an individual’s capabilities related to understanding their own thinking (metacognition) and (2) the environmental context within which the individual operates. We discuss each element in turn.

Metacognition and Metacognitive Resources

To understand the individual’s capabilities related to understanding their own thinking, we utilize the notion of metacognition. This notion captures the mindfulness of which Reger and Palmer (1996) spoke in their suggestion that, because of inadequate mental models in changing environments, individuals should adopt formal processes designed to affect and change their mental models in order to avoid cognitive inertia. These formal processes of mindfulness—intended to stimulate “thinking about thinking” (Jost, Kruglanski, & Nelson, 1998)—represent a type of metacognition, which is particularly relevant to questions of strategic change due to its centrality in learning effectiveness (Ford, Smith, Weissbein, Gully, & Salas, 1998).

While there is limited consensus on a definition of metacognition, the concept generally refers to “knowledge and cognition about cognitive phenomena” (Flavell, 1979: 906) and has been defined to be “the ability to reflect upon, understand, and control one’s learning” (Schraw & Dennison, 1994: 460). It has been suggested to have both deliberate (conscious) and automatic (less conscious) elements (Flavell, 1979; Nelson, 1996; Reder & Schunn, 1996). In our investigation of modifications of a CEO’s existing opportunity-based cognitions as it relates to strategic change, we utilize the concept of metacognition because of its central role in learning that allows individuals to manage their cognitive skills (Schraw, 1998). Specifically, in adopting a metacognitive approach we rely on the concept of metacognitive resources, which are instrumental in understanding the details of a given situation vis-à-vis one’s own cognitions (Haynie, Mosakowski, & Earley, 2005).

Previous research in metacognition differentiates between two types of metacognitive resources: metacognitive knowledge and metacognitive experience (Flavell, 1979, 1987).
Importantly, both types form part of the larger construct of cognitive adaptability—or the ability to change a mental model in a given environment (Haynie & Shepherd, forthcoming). In particular, as Haynie and Shepherd note, metacognitive knowledge and metacognitive experience together allow individuals to “generate multiple, alternative decision frameworks” and to “manage a changing environment” (forthcoming: 5). Because of their centrality in the cognitive adaptability construct, both metacognitive knowledge and metacognitive experience likely affect opportunity images. In the following paragraphs we will discuss in more detail the logic underlying this prediction.

Metacognitive knowledge refers to an individual’s specific knowledge about cognition in three particular areas: person-based knowledge, task-based knowledge and strategy-based knowledge (Flavell, 1987). Following Haynie and Shepherd (forthcoming: 6), we view metacognitive knowledge to be: the knowledge of people, tasks and strategies that are used to generate multiple decision frameworks and to manage a changing environment. Two critical elements of metacognitive knowledge as we describe it are (a) its focus on the knowledge underlying the development of multiple decision frameworks and (b) a knowledge underlying the management of changing environments. Underlying both elements of metacognitive knowledge is thus an expectation individuals with metacognitive knowledge will “select, evaluate, revise, and abandon cognitive tasks, goals, and strategies in light of their relationships with one another and with [their] own abilities and interests with respect to that enterprise” (Flavell, 1979: 908). Combined with metacognition’s centrality to learning effectiveness (Ford et al., 1998), this expectation of metacognitive knowledge-driven change leads us to predict that:

**Hypothesis 1:** CEOs with higher levels of metacognitive knowledge will be more likely to change their opportunity images than CEOs with lower levels of metacognitive knowledge.

Metacognitive experience refers to an individual’s conscious experiences that are cognitive and affective in nature (Flavell, 1987). The duration of these experiences can be either brief or lengthy and their content either simple or complex (Flavell, 1979: 908). At the core of metacognitive experience is the idea that previous affective experiences can be used to make sense of novel situations (Flavell, 1987). Metacognitive experience are often recognized as feelings (Flavell, 1979), and as such can operate automatically (Flavell, 1979). Indeed, metacognitive experience can resemble a type of intuition when, in completing a specific task, relevant past experience automatically comes to consciousness (Mitchell, Friga, & Mitchell, 2005). Thus, again following Haynie and Shepherd (forthcoming: 7), we view metacognitive experience to be: the conscious, emotional and intuitive experiences that are used to generate multiple decision frameworks and to manage a changing environment.

Prior work suggests that metacognitive experience affects the way that decisions are made (Schwarz, 2004), particularly in that it facilitates understanding of a given situation (Haynie et al., 2005). This contextual element is important in that metacognitive experiences are especially likely to occur in situations that require careful and conscious consideration, which then engenders increased cognitive control (Flavell, 1979). Important for our study, change of mental models (Barr et al., 1992) can also result from metacognitive experience insofar as such experience can lead to the creation, adaptation and abandonment of knowledge and goals (Flavell, 1979). As a result of this adjustment in thinking and learning (Ford et al., 1998), we therefore expect that:

**Hypothesis 2:** CEOs with higher levels of metacognitive experience will be more likely to change their opportunity images than CEOs with lower levels of metacognitive experience.
The Environmental Context

While the change in opportunity images is driven in part by decision makers’ metacognitive knowledge and experience, such metacognitive capabilities do not engage independent of the context in which decision makers find themselves. The role of the environment (external context) in strategic change also is well recognized (Hrebiniak et al., 1985; Romanelli et al., 1994; Smith et al., 1987), especially its impact on individual-cognition-driven change (Barr et al., 1992; Gioia et al., 1991; Schwenk, 1995). For our investigation of the second element of the individual-environment interaction, the environmental context in which an individual operates, we follow previous research (Miller & Friesen, 1982, 1983) to incorporate environmental dynamism and environmental hostility in our model of opportunity image change. In addressing the role that environmental dynamism and environmental hostility play in opportunity image change, we first discuss the impact of the environment on strategic change in general and then discuss both hostility and dynamism individually.

Change in the environment represents a double edged sword in that it can represent a threat or an opportunity (Chattopadhyay, Glick, & Huber, 2001; Dutton, Fahey, & Narayanan, 1983). Change represents a threat insofar as failure to notice change in the environment can lead to a lack of fit of the “old rules” with the environment (Schwenk, 1995). Conversely, change represents an opportunity in that firms can adapt their strategy as a result of the change, and renew the organization as a result (Barr et al., 1992). Relating to performance, firms that are able to adapt to a changing environment by changing their strategies outperform those that do not (Smith et al., 1987), particularly for more entrepreneurial and organic firms (Covin & Slevin, 1989; Zahra & Covin, 1995). Importantly, the task environment has been described along several dimensions which relate to strategic change: it can be uncertain (Lawrence & Lorsch, 1967), dynamic (Dess & Beard, 1984; Miller et al., 1982), heterogeneous and hostile (Miller et al., 1982). These dimensions have been linked to elements of change, such as adoption of an entrepreneurial posture, use of innovation, pioneering behavior and risk taking (Covin et al., 1989; Miller, 1983; Miller et al., 1982, 1983; Zahra et al., 1995).

In our approach to understanding the environmental context in which an individual operates, we rely on the notions of environmental dynamism and environmental hostility. And while the uncertainty and heterogeneity aspects of the task environment are important, we follow Dess, Lumpkin and Covin (1997) who suggest that both uncertainty and heterogeneity are subsumed in definitions of hostility (i.e., Zahra et al., 1995). This conceptualization is particularly useful because both environmental dynamism and hostility are affected by uncertainty (Dess et al., 1984; Dess et al., 1997), which when excluded from the model results in a more parsimonious and clear description of the impact of the environmental context on CEOs’ existing opportunity-based cognitions. In our approach to environmental dynamism, we follow Dess and Beard (1984) who base their definition of dynamism on Aldrich’s (1979) instability and turbulence dimensions of the environment. When viewed accordingly, environmental dynamism involves the rate (Miller et al., 1983) and unpredictability (Dess et al., 1984) of change in the environment that is the result of turnover in and interconnected between task environments (Aldrich, 1979). In our approach to hostility, we follow the definition provided by Zahra and Covin who view environmental hostility to involve “high levels of competitive intensity, a paucity of readily exploitable market opportunities, tremendous competitive-, market-, and/or product-related uncertainties, and a general vulnerability to influence from forces and elements external to the firm’s external environment” (1995: 48).
We are specifically interested in CEOs’ perceptions of environmental dynamism and hostility owing to the importance of interpretations about the environment to strategic action (Barr, 1998). More specifically, perceptions of the dynamic and hostile elements of environmental change lead to action that is intended to facilitate better understanding of the environment (Rajagopalan, Rasheed, & Datta, 1993). And it is in this process of interpretation and understanding of the dynamic and hostile elements of the environment that decision makers innovate and take risks (Khandwalla, 1987; Miller, 1983). Because of dynamism- and hostility-driven changes in the environment, strategy must be revised as a result (Miller et al., 1983). From the perspective of environmental dynamism and environmental hostility, the expectation is that greater dynamism will result in greater experimentation (Nicholls-Nixon, Cooper, & Woo, 2000). In this way, we expect that changes in environmental dynamism and changes in environmental hostility will lead to changes in strategy-related cognition (Barr et al., 1992): change resulting from dynamism as a kind of cognitive response to the turnover and interconnectedness of the environment; and change resulting from hostility as a kind of cognitive response to the high levels of competitive intensity in the environment. Thus, as next step in understanding how environmental changes trigger changes in cognition (Reger et al., 1996), we therefore hypothesize that:

Hypothesis 3a: CEOs in more dynamic environments will be more likely to change their opportunity images than CEOs in less dynamic environments.

Hypothesis 3b: CEOs in more hostile environments will be more likely to change their opportunity images than CEOs in less hostile environments.

METHOD

Research Participants

To test this study’s hypotheses we identified a sample using the CorpTech database. We decided to focus on technology ventures because the fast-changing nature of technology leads decision makers in technology-related industries to report a frequent need to make decisions about new or changing opportunities (Hughes, 1990). From this database, we selected 459 companies based on three criteria: geographical location, the inclusion of information about the president/CEO/owner of the company, and size. First, geographic location was important because the research required face-to-face interaction. Thus, distance was an important consideration in selecting which companies to contact and as such we only contacted companies in the surrounding three area codes of a large Midwestern city (i.e., within a three hour drive). Second, because our focus was on the opportunity images of the key decision maker at a company, we only included firms for which information about the president/CEO/owner of the company was provided. We did so because these individuals are more likely to motivate opportunity-based strategic change. This meant that firms that only provided contact information for a chairman of the board, a manager, a plant manager, a general manager or a vice president were excluded. Lastly, and related to the previous point, size of company was an important consideration in the research. Again, we made this choice because our research specifically involved opportunity images and we believe that a president/CEO/owner of a small-medium sized company is likely to have a larger role in making decisions about which specific opportunities to pursue than a president/CEO/owner of a large company. Thus, our list was further narrowed to companies with 10-500 employees—a range that approximates U.S. and European definitions of small and medium-sized enterprises.

To arrive at the final sample and to ensure that it was representative of the larger population, we randomly selected a subsample of the decision makers at these companies: 240 in total.
to produce a constant but manageable flow of visits, letters requesting participation were mailed in
groups of approximately twenty-five (based on geographical proximity to facilitate efficiency in
the data collection process). Within a week of the mailing, a follow-up phone call was made to the
letter recipients in order to set-up a time to meet. Data were collected over a five month period.
Of the 240 contacted, 127 decision makers agreed to participate. Of the 127 decision makers, all
but four were the president, CEO or owner of the company (and the four who were not in one of
these positions participated at the request of the president, CEO or owner, once the purpose of the
study was made clear). A logistic regression of decision makers’ response on firm age, firm size
and firm type was used to test for response bias. None of the factors in the regression were
significant, providing no significant evidence of response bias.

Because the present investigation represents part of a larger research project, 64 of the
participating decision makers were randomly assigned to participate in this study. The mean age
of the firms was 33 years (median firm age was 24 years) and the mean size of entrepreneurial
decision makers’ firms was 88 employees with $22 million in sales (median size was 30
employees with $5 million in sales). The majority of entrepreneurial decision makers in the
sample were men (94 percent), the mean sample age was 51 years, and 55 percent of the
entrepreneurial decision makers were firm founders.

**Research Task**

To capture decision makers’ opportunity images, those individuals participating in the study
engaged in an opportunity-based decision making task in which they evaluated a series of
hypothetical opportunities and decided whether or not to invest in the full-scale exploitation of
each opportunity. Because the emphasis of this study is change in entrepreneurs’ opportunity
evaluation decisions, we utilized metric conjoint analysis. This approach “requires respondents to
make a series of judgments based on a set of attributes (cues) from which the underlying structure
of their cognitive system can be investigated” (Shepherd & Zacharakis, 1997: 211).

Consistent with this approach, the hypothetical opportunities or profiles that participants
evaluated in this study consisted of four specific attributes based in the literature: potential value
of an opportunity, knowledge relatedness of an opportunity, window of opportunity availability,
and number of potential opportunities. After viewing a specific combination of these attributes,
the decision makers decided their likelihood of investing in that opportunity. To measure the
likelihood investment, we used a 9-point Likert scale anchored by “very likely to invest in this
opportunity” (9) and “very unlikely to invest in this opportunity” (1). When making these
decisions participants were asked to assume that: other than the information provided in the
profiles, the hypothetical opportunities presented are to be similar to other entrepreneurial
opportunities they have “seen” in all respects; they have the resources (or access to the resources)
to invest in the opportunity, if they choose to do so; they are making decisions about these
opportunities for their current firm; and they are making decisions about these opportunities in the
current industry and economic environment.

Each of the four decision-task attributes was varied at two levels (e.g., high v. low knowledge
relatedness of an opportunity). Because a conjoint experiment with a fully crossed factorial design
involving four attributes at two levels require 16 (2^4) profiles, an orthogonal fractional factorial
design (i.e., no correlation between attributes) was used to make the decision-making task more
manageable and shorter (see Green & Srinivasan, 1990), which results in 8 profiles (Hahn &
Shapiro, 1966). Each of the 8 profiles was fully replicated, permitting estimates of individual
subject error for use in subsequent analysis (Shepherd, Zacharakis, & Baron, 2003). So as to
avoid order effects, the orders of the original and the replicated sets of profiles were randomly assigned. Participants were familiarized with the task through use of a practice profile. Participants engaged in the decision making task two times, engaging in a distracter task between Time 1 (T1) and Time 2 (T2). In the distracter task, participants described how their decision making process was similar to decisions that they made in other areas of their life and how the decision-making hierarchy at their firm related to their decision making.

Measures and Analysis

Because our dependent variable is the change in opportunity images, we sought to understand how participants' decision making differed between T1 and T2. One of the key benefits of metric conjoint analysis is that it allows researchers to calculate separate regression equations for each set of decisions (both at T1 and T2). Change in opportunity image was measured by calculating the extent to which individuals’ T2 regression equations differed from those at T1. Because we utilized a fractional factorial design in our metric conjoint analysis, each regression for each participant consisted of four main effects and three interaction effects.

To arrive at a number describing the variance in opportunity images between T1 and T2, we followed a three-step process. First, we began by subtracting each significant \((p < .05)\) T2 beta weight, from the corresponding significant \((p < .05)\) T1 beta weight. So as to reduce error, we included only the significant attributes in their decisions. Second, we took the absolute value of each difference for each beta weight for each individual, resulting in up to seven separate scores reflecting the variance in the beta weights underlying the opportunity image. Third, we then summed the seven scores for each individual to result in our dependent variable that describes the variance in opportunity images. While this variable is intended to reflect change, we suggest that our variable does not suffer from the same problems as the simple difference score as described by Bergh and Fairbank (2002). Instead, our measure captures what Bergh and Fairbank (2002) would like classify as the “true” variance (at the \(p < .05\) level) in decision makers’ actual opportunity evaluation decisions. Given that our focus is on this kind of variance, we believe this approach is justified.

To measure metacognitive knowledge and metacognitive experience, we used a slightly modified version of the scale developed by Haynie and Shepherd (forthcoming). Specifically, metacognitive knowledge was measured with seven items for which decision makers were asked to indicate on a 7-point Likert-type scale the extent to which they strongly disagree (1) to strongly agree (7) with a series of statements regarding their knowledge about their own cognition. The reliability of the metacognitive knowledge scale was within conventional ranges (\(\alpha = 0.70\)). Similarly, metacognitive experience was measured with six items for which entrepreneurs were asked to indicate on a 7-point Likert-type scale the extent to which they strongly disagree (1) to strongly agree (7) with a series of statements regarding their experience with cognition. The reliability of the metacognitive experience scale also was within conventional ranges (\(\alpha = 0.74\)).

To measure perceptions of environmental dynamism and environmental hostility we used a variant of the Miller and Friesen (1982) dynamism/hostility scale—similar to that used by Covin, Green and Slevin (2006). Dynamism was measured using seven items for which entrepreneurial decision makers were asked to indicate on 7-point Likert-type scale the extent to which they strongly disagree (1) to strongly agree (7) with a series of statements regarding the dynamic nature of the environment. The reliability of the environmental dynamism scale was within conventional ranges (\(\alpha = 0.83\)). Similarly, hostility was measured using six items for which entrepreneurs were also asked to indicate the extent to the extent to which they strongly disagree (1) to strongly agree
We used regression analysis to test the hypothesized effects of metacognitive knowledge, metacognitive experience, environmental dynamism and environmental hostility on change in opportunity image. Because experience is expected to impact opportunity images (Ashby & Maddox, 2005), we include years of industry experience as a control (both in the primary industry and in different, but similar, industries).

RESULTS

Table 1 shows the summary statistics and provides the regression results for the model. While the positive and significant results in model 2 related to metacognitive knowledge indicate support for hypothesis 1 ($\beta = 0.37$), the negative coefficient for metacognitive experience ($\beta = -0.31$) indicates that increases in such experience are associated with a decrease in opportunity image changes (contrary to hypothesis 2). Moreover, in model 3 the coefficient for metacognitive experience is only marginally significant. Thus, hypothesis 2 is not supported. In model 3, the significant negative coefficient for perceived environmental dynamism ($\beta = -0.30$) runs contrary to hypothesis 3a. Specifically, it suggests that environmental dynamism is negatively related to change in opportunity images. Accordingly, hypothesis 3a is not supported. The positive and significant coefficient for perceived environmental hostility ($\beta = 0.27$) indicates support for hypothesis 3b. In the discussion section, we discuss the results and further explore the potential rationale for the negative effects of both metacognitive experience and environmental dynamism on change in opportunity images.

DISCUSSION

In this study our goal was to explore the mechanisms of change in entrepreneurial decision makers’ opportunity images. Specifically using a field study, we investigated the degree to which the presidents/CEOs/owners of small-medium sized firms changed their choices concerning investments in a set of hypothetical opportunities. We wanted to see if these choices would be stable over time or whether individuals who think regularly about their thinking (have metacognitive knowledge and experience) and work in a more dynamic or hostile business contexts would change their choices more extensively than those who did not. The questions we ask in this paper address a key process in entrepreneurship (opportunity recognition—e.g., Baron et al., 2006). However change management is also a core process throughout all strategic activity (e.g., Anderson et al., 2007). The answers we find in these results not only inform our understanding of these two central processes but perhaps provide insight into how managers manifest dynamic capabilities (e.g., Teece, Pisano, & Shuen, 1997).

In Hypothesis 1, we found a strong positive, relationship between the degree to which CEOs are self-aware about their own thinking processes and change in opportunity images. As we predicted, the more that CEOs have such metacognitive knowledge, the more willing they are to change their decisions. This finding is consistent with the idea more self-aware (metacognitively capable) CEOs would be willing to think about their choices and change them if they determine an alternative perspective might, in hindsight be more appropriate. As decision makers consider entrepreneurial opportunities, such circumstances are not static. They change for a wide variety of reasons and the ability to rethink whether such opportunities really are advantageous would seem
to be a helpful capability. These results help explain how entrepreneurs refine and augment their assessments of the opportunities they face through metacognitive processes. Such flexibility can be extended more broadly to general strategic choice; particularly critical in the organizational adaptation process (Mintzberg & McHugh, 1985). Our results suggest that decision makers with higher metacognitive knowledge may be more willing (able) to take in new information or at least rethink prior information. Such recursive thinking is a hallmark of flexible decision making (Sharfman et al., 1997) and has been touted as a remedy for “snap” judgments. Specifically, reexaminations “prevent uncritical acceptance of the seemingly obvious” (Schweiger, Sandberg, & Rechner, 1989:747). Such recursive activity also carries through from decision making to strategic implementation (Quinn, 1980) as decision makers regularly go from decision premises to choices to implementation actions and back again (e.g., Cyert & March, 1963).

The ability to engage in such recursive thinking and action also would seem to help explain how decision makers are able to implement dynamic capabilities (Teece et al., 1997). Being flexible in an evolving environment is not enough. To respond effectively to that evolving environment, decision makers must be able to apply their firm’s capabilities to situations as they change (Wiersema & Bantel, 1992). Thus, the ability of an organization to anticipate and respond to opportunities or pressures for change may well be a function of the degree to which senior managers can think about their choices and revise them as needed. Our results would suggest that extending our study into the processes by which firms manage their capabilities dynamically may be quite a fruitful exercise.

In Hypothesis 2 we predicted that decision makers with higher levels of metacognitive experience also would be more likely to change their opportunity images. This hypothesis was not supported because although the coefficient on this variable was significant the sign was the opposite of what we had predicted. While we were surprised at this result, upon reflection it is not that hard to understand. While it would seem reasonable that CEOs with more experience with metacognitive actions would be more likely to engage in them and subsequent change, the original prediction may have ignored the potential for learning as part of the metacognitive process. As part of the metacognitive activities in which CEOs engage, they may be able to learn when rethinking one’s choices is appropriate and perhaps when it is not. In this way, decision makers learn to think about their own thinking by understanding when it is appropriate to change and when it is not. One possible explanation of such learning would be that as decision makers metacognitively examine their choices, they may begin to recognize patterns—either in their own thinking or in their own context that suggests to them the choice they have made is already correct and does not require change (e.g., Simon, 1987). While metacognitive knowledge may increase the likelihood of change, metacognitive experience seems to temper CEOs’ propensity to do so. Again, on reflection is not that surprising as CEOs have more metacognitive experience and have more experience with the focal firm and the industry in question, and thus are more likely to recognize patterns in their own cognition than are lower level or less experienced decision makers. Another interesting research question stemming from our results is the extent to which metacognitive experience in those with less experience (less well developed knowledge structures e.g., Barr et al., 1992) would inhibit opportunity image change.

Such inhibition might be a valuable safeguard for firms. If metacognitive experience inhibits rethinking prior decisions, its use may protect the firm from learning (adapting) too quickly (Levinthal & March, 1993). While change is an integral part of organizational life, if the firm adapts too quickly decision makers may mistakenly make choices that are not appropriate for the context or the issue at hand. Alternatively, metacognitive experience may impede change when more a more rapid response is required. The challenge then would be applying metacognitive
knowledge and metacognitive experience in the most effective combination for the given change circumstance. It would seem that those firms who most effectively apply dynamic capabilities (Teece et al., 1997) do just that.

In Hypothesis 3a we predicted that decision makers operating in highly dynamic environments would be more likely to change their opportunity images. Our results suggest that the opposite is true in that they are less likely to do so. There are two alternative explanations of this surprising finding. First, it may be that dynamic environments present contexts that are too cognitively complex for decision makers to wish to change their judgments. When industries are highly dynamic, demand fluctuates dramatically and new technologies are introduced rapidly (Dess et al., 1984). All of the change around decision makers may make them wish to satisifice (Cyert et al., 1963) in terms of their opportunity image choices. In other words, once decision makers in dynamic environments decide about an opportunity, they may simply want to leave the decision alone because of dynamism-driven cognitive complexities. The other alternative explanation for this finding is that decision makers may find the change itself threatening and respond with rigidity in their judgments. Under dynamic environments accurate assessments of the current conditions, the link between action and outcomes or even what outcomes are available are unclear (Milliken, 1987). Particularly in the contexts in which our participating CEOs find themselves, dynamism can be so extreme that it becomes threatening and causes paralysis in decision making (Staw, Sandelands, & Dutton, 1981) or at least reduces the propensity to want to change prior choices. One might predict that a hostile business environment (i.e., one with high levels of competition) might be seen as more threatening and hence more likely to inhibit change but our results do not support this. In this data set, it appears that the cognitive complexity of dynamic environments induced more of a rigid response than does a competitively threatening one. As we discuss below, the CEOs in our sample are all working in small to medium sized businesses in technologically intense environments. They may be used to competition, so perhaps it is intense dynamism that causes more problems cognitively.

In Hypothesis 3b we predicted that CEOs in more competitively hostile environments would be more likely to change their opportunity images and indeed the results confirm this prediction. In the types of environments within which the participating CEOs find themselves, competition-driven change is a fact of life. Competitive moves and countermoves that small technology-based firms face constantly require fairly constant reevaluation of the context and particularly of opportunities. If one CEO does not take advantage of a particular opportunity then someone else will. As such, it is adaptive to reevaluate the opportunities that present themselves. An ongoing refinement of one’s schema about these opportunities would seem consistent with the environment of change in which these CEOs find themselves.

Limitations of the Study

As with any research project this one has limitations that should be acknowledged. One potential limitation is the sample size. While the sample is large enough to provide sufficient statistical power to test the hypotheses, its absolute magnitude may cast doubt for some readers on the generalizability of the results. The nature of the participants however helps offset this concern. These participants were all CEOs or their designee. As such, they generally represent the most skilled decision makers in a particular firm. The average participant was highly experienced and older, running a relatively mature firm. While the firms on average were small to medium sized, CEOs from such a population of firms likely will be more in touch with the types of opportunity identification situations that we used in our field study. So while the absolute magnitude of the sample is small, it is a rich data source that is particularly suited to provide
valuable insights to the processes under study.

A second potential criticism is that the content of the decisions made by the participants is exclusively within the realm of entrepreneurship research and of little broader value. While clearly opportunity recognition is a core area of inquiry within the entrepreneurship literature, all firms make such choices as part of their strategic analysis and opportunity recognition has been part of the central research in strategic management processes for over 25 years (e.g., Dutton et al., 1983). As we examine the management of firm capabilities more closely, there is growing consensus that not only do firms need to manage their resources and capabilities effectively they must do so dynamically. Our results begin to shed light on how managers engage in such dynamic capability management.

Finally, one might take issue with the fact that the internal consistency (alpha) statistic for the environmental hostility scale was below current convention. We used the measure in spite of this problem for two reasons. First, we were able to achieve reliability with the scale higher than did its original authors. And second, while the value we obtained is below current convention it is above the minimum threshold that Nunnally argued for in his original discussion of the level of acceptable minimum alpha for developing scales (Nunnally, 1967).

CONCLUSION

Change is a way of life for modern organizations, particularly in a globalizing economy. How managers manage in this face of such change is a core question in organization studies research. Of particular interest to entrepreneurship researchers is how entrepreneurs’ understanding of the opportunities they face evolves. In pursuing this question, we uncovered relationships that not only help us understand the changes entrepreneurs make in their opportunity images but also have much broader potential implications in organizational change and change management. Our results can be interpreted to argue that the characteristics of decision makers (their metacognitive resources) and the ways in which they perceive their context can predict how and perhaps how well decision makers employ opportunity-based firm capabilities dynamically.

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REFERENCES


<table>
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\(^1 p < .10\)  
\(^* p < .05\)  
\(^** p < .01\)  
\(^† p < .001\)  
\(^1\) Change in opportunity image mean = 0.64, s.d. = 0.37