



A situated metacognitive model of the entrepreneurial mindset^{☆,☆☆}

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ABSTRACT

We develop a framework to investigate the foundations of an ‘entrepreneurial mindset’ – described by scholars as the ability to sense, act, and mobilize under uncertain conditions. We focus on metacognitive processes that enable the entrepreneur to think beyond or re-organize existing knowledge structures and heuristics, promoting adaptable cognitions in the face of novel and uncertain decision contexts. We integrate disparate streams of literature from social and cognitive psychology toward a model that specifies *entrepreneurial metacognition* as situated in the entrepreneurial environment. We posit that foundations of an entrepreneurial mindset are metacognitive in nature, and subsequently detail how, and with what consequence, entrepreneurs formulate and inform “higher-order” cognitive strategies in the pursuit of entrepreneurial ends.

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1. Executive summary

Scholars have suggested that “the successful future strategists will exploit an entrepreneurial mindset...the ability to rapidly sense, act, and mobilize, even under uncertain conditions (Ireland et al., 2003: 963–989).” Implicit in this conceptualization is that the origins of such a mindset are, at least in part, cognitive in nature.

Generally, entrepreneurship scholars engaged in cognitive research seek to understand how individuals identify entrepreneurial opportunities and act upon them (McMullen and Shepherd, 2006). The current paper embraces this endeavor, but proposes a new lens focused on the process through which entrepreneurs develop and inform “higher-order” cognitive strategies, reflective of their own motivations and environments, in the pursuit of desirable entrepreneurial outcomes. We draw upon research on situated cognition to describe an entrepreneur as a ‘motivated tactician’, representative of “a fully engaged thinker who has multiple cognitive strategies available, and chooses among them based on goals, motives, and needs” (Fiske and Taylor, 1991: 13). We integrate this perspective with work on metacognition – the higher-order cognitive processes responsible for the development and selection of cognitive strategies – to propose a model of the entrepreneurial mindset based upon situating metacognitive processes in the entrepreneurial context.

Our situated metacognitive model of the entrepreneurial mindset offers important insights into entrepreneurial thinking and behaviors; the dynamism and uncertainty inherent in an entrepreneurial context requires entrepreneurs to continuously “rethink current strategic actions, organization structure, communications systems, corporate culture, asset deployment, investment strategies, in short every aspect of a firm’s operation and long-term health (Hitt et al., 1998: 26)” in the context of a contemporary

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business environment where both technology and knowledge are becoming obsolete at a rate unprecedented in history (Wankat and Oreovicz, 1998). To that end, entrepreneurs such as John Chambers of Cisco Corporation, Charles Schwab, Richard Branson of Virgin-Atlantic, and Paul Orfalea of Kinko's describe cognitive strategies such as thinking in pictures, employing analogies, and synthesizing information relative to some goal as critical 'thinking' techniques they developed to overcome the complexity of the business environment. Each entrepreneur credits these techniques for helping them identify opportunities, consider alternatives, and overcome dynamism in a way fundamentally different from their contemporaries (Fortune magazine, 2002). In the context of cognitive science, these techniques represent examples of learned strategies that promote the process of "thinking about thinking," or more precisely metacognition.

Why is it that these entrepreneurs 'think' differently about a given entrepreneurial task (and subsequently behave differently)? Why do these entrepreneurs credit 'the way they think' with being a key element of their success? We suggest that differences in performance on entrepreneurial tasks may be explained, in part, by the role that metacognition plays in promoting cognitive adaptability. Importantly, metacognition can be enhanced through training (Schmidt and Ford, 2003; Nietfeld and Schraw, 2002; Mevarech, 1999). Given the previously acknowledged complexity and dynamism that characterize entrepreneurial environments, the ability of entrepreneurs to engage metacognitive processes is related to their ability to cognitively adapt, and therefore perform effectively given a changing and often novel context. As such the insights and prescriptions suggested by the model have potentially important implications for both the theory and practice of entrepreneurship.

2. Introduction

Scholars posit that "the successful future strategists will exploit an entrepreneurial mindset...the ability to rapidly sense, act, and mobilize, even under uncertain conditions" (Ireland et al., 2003: 963–989). To sense and adapt to uncertainty characterizes a critical entrepreneurial resource (Ireland et al., 2003; Krauss et al., 2005; McGrath and MacMillan, 2000), and extant conceptualizations of an entrepreneurial mindset indicate that this resource is, at least in part, cognitive in nature. That said, while the ability to sense, act, and mobilize may be central to entrepreneurship, entrepreneurial cognition researchers have focused primarily on those cognitive processes that *inhibit* adaptive cognitions in the face of dynamic, uncertain environments (e.g. embedded biases (Mitchell et al., 2000), decision heuristics (Alvarez and Busenitz, 2001; Busenitz and Barney, 1997), and overconfidence bias (Hayward et al., 2006). Such an acknowledgement is not a criticism of this research, rather we highlight the orientation of the extant literature to distinguish our purpose, which is to investigate those cognitive processes that may enable entrepreneurs to think *beyond* existing knowledge structures and heuristics, to promote adaptable cognitions in an entrepreneurial context.

In this article we represent the foundation of the entrepreneurial mindset to be cognitive adaptability, which we define simply as the ability to be dynamic, flexible, and self-regulating in one's cognitions given dynamic and uncertain task environments. Adaptable cognitions are important in achieving desirable outcomes from entrepreneurial actions (Krauss et al., 2005). In this paper we develop a situated, metacognitive model of the entrepreneurial mindset that integrates the conjoint effects of entrepreneurial motivation and context, toward the development of metacognitive strategies applied to information processing within an entrepreneurial environment. We draw from social cognition literatures to describe the entrepreneur as a 'motivated tactician', representative of "a fully engaged thinker who has multiple cognitive strategies available, and chooses among them based on goals, motives, and needs (Fiske and Taylor, 1991: 13)" to act (or not) in response to perceived opportunities (McMullen and Shepherd, 2006). We integrate this perspective with work on metacognition – most simply described as "thinking about thinking" (Flavell, 1979, 1987) – to develop a model that concomitantly describes the process through which the goals and motivations of the entrepreneur, as well as the attributes of the entrepreneurial context, are represented – and ultimately serve to define – metacognitive strategies responsible for framing how one senses, reflects, and adapts strategies to 'think' about entrepreneurial action. Our model of the entrepreneurial mindset makes three, primary contributions.

First, a metacognitive lens allows for the dynamic consideration of cognitive functioning focused on how decision heuristics and strategies develop, adapt, and are employed over the duration of the entrepreneurial process. Our model enables the study of the dynamics of sense-making in a context that begins prior to the identification of the entrepreneurial opportunity, and runs through the many stages and steps associated with entrepreneurial action. Second, metacognitive processes are important in dynamic, uncertain environments like those that entrepreneurs typically face. When environmental cues change, individuals adapt their cognitive responses and develop strategies for responding to the environment (Earley et al., 1989; Shepherd et al., 2007). Researchers have found that metacognitive awareness is positively related to adaptable decision-making (Schraw and Dennison, 1994). Individuals who are metacognitively aware are more likely to formulate and evaluate multiple alternatives to process a given task, and are also highly sensitized and receptive to feedback from the environment that can be incorporated into subsequent decision frameworks (Melot, 1998). Given the dynamism and uncertainty surrounding entrepreneurial action (Knight, 1921; McMullen and Shepherd, 2006), metacognition facilitates studying *how* entrepreneurs adapt to their evolving and unfolding context and why some adapt while others do not. Finally, metacognition is not a dispositional trait, but instead represents a learned process (Nelson, 1996), which can be enhanced through training (Schmidt and Ford, 2003; Nietfeld and Schraw, 2002; Mevarech, 1999). We offer a situated metacognitive model of an entrepreneurial mindset; the inclusion of metacognitive training in entrepreneurship pedagogy will advance 'adaptable' thinking – an attribute of fundamental importance to entrepreneurs.

3. A situated metacognitive model of an entrepreneurial mindset

3.1. Situating cognitive and metacognitive processes

Some have suggested that the field of cognitive science has carried the *computer metaphor* of human cognition too far, failing to allow for an interaction between individual cognition and the social/environmental context (Schwarz, 1998a; Tetlock, 1990). Static models based on scripts, heuristics, and decision biases depend implicitly upon the consistency of information processing across settings, and emphasize mechanisms for conserving limited cognitive resources. Alternatively, recent advances in ‘situated cognition’ research conceptualize information processing strategies as dynamic, and adaptable in response to the environmental context (Operario and Fiske, 1999). Given that our interest is focused on understanding how the entrepreneurial context interacts with the goals and motivations of the entrepreneur to inform the development of an entrepreneurial mindset, we adopt a socio-cognitive orientation. Like Schwarz (1998a,b), we assume that models based primarily on individuals’ constrained information processing capabilities are limited in their ability to address the dynamic interplay of entrepreneurial context, individual thought, and human motivations from which important entrepreneurial outcomes such as opportunity recognition and action may result. Adopting a socio-cognitive framework suggests a conceptual basis for investigating how, and with what consequence, the concomitant consideration of the motivations of the entrepreneur and the entrepreneurial environment serve to inform the development of metacognitive strategies activated in response to entrepreneurial tasks.

Metacognition describes the process of formulating strategies positioned to choose from a set of available cognitive mechanisms, given what the individual understands about their own motivations, assumptions, strengths, and weaknesses (Flavell, 1987). To think metacognitively, for example, describes such activities as “to be self-aware, to think aloud, to reflect, to be strategic, to plan, to have a plan in mind, to know what to know, to self-monitor” (Guterman, 2002: 285). Importantly metacognition is not represented in the literature – or in this article – as a dispositional trait, but instead as a dynamic, learned response that can be enhanced through experience and training (Schmidt and Ford, 2003; Flavell, 1987). In essence, metacognition represents the control that the individual has over their own cognitions as a function of a differing ability (between individuals or within an individual over time or from training) to consider alternative cognitive strategies in light of a changing environment. Given this conceptualization, it follows that control over one’s cognitions that results in an ability to consider alternative cognitive strategies makes for more dynamic information processing; the normative implications of metacognition are potentially important in entrepreneurship. For example, Staw and his colleagues demonstrate that employing a metacognitive strategy is positively related to an individual’s ability to choose the most appropriate/effective course of action in light of his or her motivations, and changing environmental context (Staw and Boettger, 1990; Staw et al., 1981). Alternatively, studies have demonstrated that individuals constrained in their metacognitive abilities are less likely to engage alternative strategies, and are therefore less adaptable when the decision-context changes, or when it is novel and uncertain (Batha and Carroll, 2007).

3.2. Conceptual model

Our situated, metacognitive model of the entrepreneurial mindset is presented in Fig. 1, and is explained stepwise based on its five major elements. The elements of the metacognitive model depicted here represent a set of inter-related processes that *together* describe metacognitive functioning. The model is described below as follows: Step 1) the conjoint effect of the environmental context and entrepreneurial motivation; Step 2) the activation of metacognitive awareness, Step 3) the critical metacognitive resources – metacognitive knowledge and metacognitive experience, Step 4) metacognitive strategy formulation, and Step 5) metacognitive monitoring and performance feedback mechanisms. Although the five steps represent the causal chain of an entrepreneurial mindset, adaptation may not begin with Step 1 as the model is representative of an iterative process (such as with, for example, sensemaking [Weick, 1979]). Propositions relating the process components of an entrepreneurial mindset are also presented.

3.3. Boundary conditions and key assumptions

Prior to developing the framework more fully, it is important to clearly detail the boundary conditions and key assumptions applied to the development of the model. We chose to situate our metacognitive model in the entrepreneurial context for two reasons. First, metacognition represents a mechanism that facilitates *adaptive* cognitions, and ultimately adaptive actions. A key success factor in the performance of entrepreneurial tasks is adaptability (Ireland et al., 2003; Shepherd et al., 2007). Further, metacognitive processes are activated in response to contexts that are perceived by the individual to be dynamic, uncertain, and novel. A fundamental assumption of entrepreneurship is that the context is often high in novelty, uncertainty, and dynamism. For example, entrepreneurship refers to the discovery, evaluation, and exploitation of opportunities to bring into existence *future* good and services (Shane and Venkataraman, 2000), and entrepreneurial action involves acting “upon the possibility that one has identified an opportunity worth pursuing” (McMullen and Shepherd, 2006: 132). A metacognitive model situated in the entrepreneurial context is likely to have greater explanatory ability – and practical importance – than a model developed in contexts where adaptability is less central, and the task involves less uncertainty and novelty. Although our model is not industry specific, it is more applicable to those industry sectors that demand and reward the ability to adapt one’s approach to thinking and problem-solving, and ultimately patterns of action.

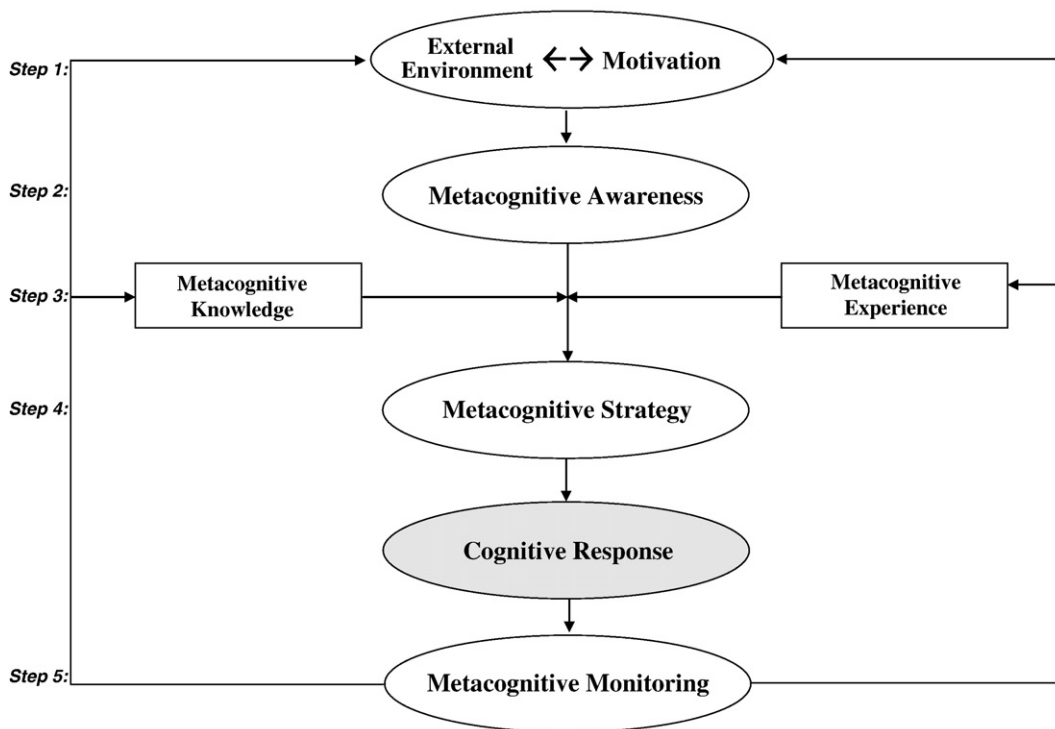


Fig. 1. A situated metacognitive model of the entrepreneurial mindset.

Our model focuses on the metacognitive rather than the cognitive level of analysis. In the context of entrepreneurship, cognition is defined as the “knowledge structures [heuristics, schema] that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, or growth” (Mitchell et al., 2002a,b: 97). Alternatively, metacognition describes a higher-order process that reflects *one’s awareness and control* over the knowledge structures that are employed to make assessments, judgments, or decisions. Flavell writes that metacognition represents the individual’s “knowledge and cognition *about* cognitive phenomena” (1979). For example, when faced with a new and novel decision task, a metacognitively aware individual might engage in self-questioning strategies designed to relate the current task to past experiences, incrementally test alternative solutions and reflect on differing outcomes, or draw upon prior knowledge, experience, and intuition to formulate a set of strategic alternatives.

To be clear in terms of distinguishing metacognition from cognition, we offer an example both situated in the extant entrepreneurship literature, and also in an entrepreneurial decision context. Consider an entrepreneur faced with the entrepreneurial task of developing marketing strategy for a new venture in preparation for an important meeting with a venture capitalist. Before the entrepreneur is prepared (as a matter of a cognitive progression) to evaluate alternative marketing strategies, the entrepreneur must first formulate a strategy to frame how he or she will ‘think’ about this task. This process is *metacognitive*. Suppose the entrepreneur frames the task in a way consistent with what Sarasvathy (2001) describes as ‘effectuation’. The entrepreneur’s effectual approach to ‘thinking’ about how to frame the entrepreneurial task will subsequently define the set of available, alternative outcomes from which the entrepreneur will ultimately select a response. Consider that, for example, a causal strategy to ‘think’ about the entrepreneurial task [as opposed to effectual] would likely result in a very different set of alternative strategies from which to select a course of action. The process responsible for ultimately selecting a response (i.e. a guerilla marketing campaign) is *cognitive* – the process responsible for ultimately selecting how the entrepreneur will frame the entrepreneurial task (effectuation) is *metacognitive*. Thus to study metacognition is *not* to study why the entrepreneur selected the guerrilla marketing strategy for a set of alternative strategies (cognition), but instead to study the higher-order cognitive process that resulted in the entrepreneur framing the task effectually, and thus why and how the guerrilla marketing strategy was included in a set of alternative responses to the decision task (metacognition).²

Finally, consistent with empirical findings from the education and psychology literatures, we conceptualize metacognitive awareness as an ability that can be developed, and not as a dispositional trait (Mevarech, 1999). The development and application

² This distinction highlights an additional boundary condition; because our model operates at the metacognitive level of analysis, it is not our purpose to explain heterogeneity in the cognitive-level inputs to the model (differences in motivation, perceptions of context/environmental conditions, goals). Instead our purpose is to investigate *how* these attributes influence the metacognitive processes associated with dynamic and adaptable processing of the entrepreneurial environment.

of metacognitive processes cannot be predicted “with even a moderate degree of accuracy” from domain knowledge (Glenberg and Epstein, 1987) and is “separate from other cognitive constraints on learning” such as intelligence (Shraw and Dennison, 1994: 461). Multiple studies – across contexts – demonstrate that metacognitive training manipulations relate positively to improvements in decision performance in the face of new and complex decision tasks (Batha and Carroll, 2007).

3.4. The causal chain of an entrepreneurial mindset

3.4.1. Step 1: the interaction of the environment and entrepreneurial motivation

Recently many prominent psychologists have assumed a situated cognition perspective, embracing the notion that individual motivations and environment influence the development and selection of cognitive strategies (Earley et al., 1989; Kahneman, 1973; Schwarz, 1998a; Staw and Boettger, 1990; Tetlock, 1990). Allen and Armour-Thomas (1993: 204) noted that cognitive processes “emerge, develop, and are displayed within a socio-cultural milieu... [and that] contextual forces serve a socializing function in shaping the development and deployment of mental processes in ways that facilitate or constrain task performance.” This description focuses the study of cognition toward *how and why* an individual interacts with people and situations (Suchman, 1987). As result, it is impossible to separate the actor from the context, because the actor constructs mental models that facilitate reasoning based on goals, motivations, and inputs from that environment (Tetlock, 1990). Entrepreneurship scholars adopting a situated cognition perspective have suggested that certain motivational states activate specific cognitive interpretations, such as, the formation of a belief that specific changes in the environment represent an opportunity worth acting upon (Shepherd et al., 2007).

The top of Fig. 1 depicts the relationship between an entrepreneur's motives and context. Motives influence how the environment is perceived and interpreted (Griffin and Ross, 1991; Schacter, 1996). That is, an entrepreneur's motivation serves to direct his or her attention to contextual cues that signal changes in that environment that in an entrepreneurial context, may represent opportunities (Shepherd et al., 2007). At the same time, the environment may define an individual's motives (Wyer and Srull, 1989). For example, a hostile environment often motivates decision makers to avoid losses, while a munificent environment motivates them to seek gains (Davies and Walters, 2004). The interaction between the environment, and one's entrepreneurial motivation, serves as the basis for the development and employment of metacognitive strategies focused on satisfying one's motives through entrepreneurial action; that is, achieving a desirable entrepreneurial outcome. Although the desirability of entrepreneurial outcomes differs across entrepreneurs, they are defined as being congruent (desirable) or incongruent (undesirable) with his or her motives given the nature of the entrepreneurial task. Entrepreneurial outcomes can be represented as opportunity discovery (Shane, 2000; Shane and Venkataraman, 2000), a speedy decision (Alvarez and Busenitz, 2001; Eisenhardt, 1989), or substantially growing the firm (Hmieleski and Corbett, 2008; Wiklund and Shepherd, 2003). Therefore, the extent to which the entrepreneur understands and interprets the environment – within the context of his or her own motivations – will serve to focus metacognitive processing toward the development and evaluation of alternative strategies appropriate to achieve desirable entrepreneurial outcomes. This conceptualization is consistent with Jost and colleagues, who noted that individuals are “dynamic, flexible, self-regulating creatures who are sensitive to variations in their social and physical environments and who plan and implement a wide variety of personal and social goals for the purpose of understanding and changing reality” (Jost et al., 1998: 138). As such, our model of an entrepreneurial mindset describes metacognitive processing as originating from the conjoint effects of 1) the environment in which the entrepreneur functions, and 2) the motivations of the entrepreneur through which the environment is interpreted. This is an intuitive, but nonetheless critical, first step in terms of understanding the role that the entrepreneurial environment – together with the motivations of the entrepreneur – plays in ultimately defining entrepreneurial actions. Thus,

Proposition 1. The entrepreneur's motivations and environment conjointly activate metacognitive processing, focused on developing and evaluating alternative cognitive strategies appropriate to achieve desirable entrepreneurial outcomes.

3.4.2. Step 2: metacognitive awareness

While how the entrepreneur perceives and interprets the interaction between the environment and his or her own motivations directs the *focus* of metacognitive processing (i.e. toward achieving a desirable entrepreneurial outcome in the face of a changing context), the *extent* (level of effort) of that processing depends upon the entrepreneur's level of metacognitive awareness. Metacognitive awareness represents a general level of awareness one has concerning their own cognitions focused on a specific entrepreneurial task. Entrepreneurial tasks are those central to discovering, evaluating, and exploiting opportunities to create future goods and services (Shane and Venkataraman, 2000). Brockner et al. (2003) described several tasks central to successful entrepreneurial action, including conceiving the entrepreneurial idea, screening the idea, procuring resources, and proving the business model through execution.

Metacognitive awareness is heightened – or lessened – based on how the perceived level of novelty, uncertainty, and dynamism associated with the task. In this regard, metacognitive awareness can be considered analogous to the volume of a stereo receiver where as the perceived novelty, uncertainty, and dynamism of the entrepreneurial task increase, so does metacognitive awareness (see Flavell, 1979, 1987; Kahneman, 1973). Increases in metacognitive awareness, in turn, make it more likely that the entrepreneur will engage metacognitive resources toward formulating and evaluating multiple, alternative strategies for processing the entrepreneurial task, and determining the actions most likely to produce his or her desired outcome.

It is important to acknowledge that we assume heterogeneity in the novelty, uncertainty, and dynamism of entrepreneurial tasks; that is, while uncertainty and newness are central [generalizable] to the entrepreneurial process (Knight, 1921; McMullen

and Shepherd, 2006), variability exists across the tasks that make up the entrepreneurial process. Entrepreneurial tasks have been characterized in terms of high uncertainty (Knight, 1921; McMullen and Shepherd, 2006), involve novelty – newness in terms of new products, new markets, and/or new organizations (Lumpkin and Dess, 1996), and must deal with a rapidly changing environment (Eisenhardt, 1989; Eisenhardt and Martin, 2000). This implies that [generally] entrepreneurs are likely to have heightened metacognitive awareness relative to managers of well established firms, in stable environments, offering incremental improvements to existing products in existing markets. That said, in the context of the entrepreneurial process it is also likely that some entrepreneurial tasks may be perceived by the entrepreneur as routine, clearly defined, and stable. In these cases, metacognitive awareness in response to the task at hand decreases. Thus,

Proposition 2. The greater the perceived novelty, uncertainty, and dynamism associated with the entrepreneurial task, the higher the metacognitive awareness.

3.4.3. Step 3: metacognitive resources: metacognitive knowledge and metacognitive experience

The level of metacognitive awareness activated in response to an entrepreneurial task will determine the extent to which metacognitive resources are employed in the process of formulating a strategy to ‘think’ about a specific entrepreneurial task. Flavell (1987) highlighted two types of metacognitive resources – metacognitive knowledge and metacognitive experience – which play key roles in the formulation of metacognitive strategies.

Metacognitive knowledge refers to one's conscious and cognitive understanding of 1) people, 2) tasks, and 3) strategy (Flavell, 1987). Metacognitive knowledge of people reflects perceptions about oneself, and about others, in terms of competencies, weaknesses, and also about how people think. Examples include a belief that one is good at dealing with the “hard” numbers of a business, and less competent in the “softer” tasks of human resource management (intra-individual); or a belief about how another person thinks (inter-individual), and knowledge that people make mistakes in their thinking, such as a recognition that most people are overconfident (universal). Alternatively, metacognitive knowledge of tasks refers to the nature of information acquired by an individual concerning a specific activity (i.e., calculating cash flows, or writing a business plan). Metacognitive knowledge of tasks influences how information is used in various contexts, or in light of varying goals. For example consider an entrepreneur reviewing a business plan from a potential partner, with an eye toward forming a strategic alliance. The plan is highly technical, and densely written, thus requiring a considerable investment of time for full comprehension. Alternatively, less time will be invested – and the entrepreneurs focus may be different – when the same entrepreneur reviews a business plan for a university's business plan competition. While the activity is the same (reviewing a business plan), both the time invested, and the nature of the information acquired by the entrepreneur will be different as a function of the disparate purposes of the substantially similar task. Finally, metacognitive knowledge of strategy refers to procedures for ensuring that a cognitive strategy is appropriate for achieving some desired goal. For the example of the entrepreneur reviewing a business plan with unique and tightly packed information, metacognitive knowledge of strategy might lead him or her to skim the material briefly to decide the best procedure for assessing the business opportunity given what he or she knows about the market or the technology (e.g., first, evaluate the top management team; second, search the financial statements for “fatal flaws”, etc.). Metacognitive knowledge represents a resource that is informed based on what the entrepreneur understands to be true about people, tasks, and strategy, and can be brought to bear upon the task of formulating a metacognitive strategy to realize a desired outcome from the entrepreneurial task at hand.

The second type of metacognitive resource, metacognitive experience, consists of individual experiences that are affective, based on cognitive activity, and serve as a conduit through which previous memories, intuitions, and emotions may be employed as resources given the process of making sense of a given task (Flavell, 1987). For example, an entrepreneur has a metacognitive experience if he or she has the feeling that something is hard to do or comprehend. Likewise, metacognitive experiences occur if the entrepreneur perceives that he or she is failing at some cognitive task, or if one has the feeling that a goal is difficult to attain. Another example is a feeling of knowing how actions are likely to unfold. These experiences arise in everyday life, and are more easily interpreted with age and experience (Flavell, 1987). Metacognitive experiences allow entrepreneurs to better interpret their social world (Earley and Ang, 2003) and therefore, along with metacognitive knowledge, serve to frame how the entrepreneur will interpret a given entrepreneurial task. As such, metacognitive experience represents a stock of cognitive resources representative of the entrepreneur's intuitions, affective experiences, and emotions, which can be brought to bear on formulating a metacognitive strategy to realize a desired outcome.

It is important to note that knowledge and experiences can only be characterized as metacognitive in cases when the individual has an awareness of how that knowledge or experience relates to formulating a strategy to process the task at hand. The extent to which the entrepreneur will draw upon these metacognitive resources (metacognitive knowledge and experience) is a function of metacognitive awareness. The more metacognitively aware, the more the entrepreneur will work to consciously control his or her cognitions in a way so as to employ mechanisms such as analogical reasoning, think-aloud protocols, and counterfactual thinking – each mechanism positioned to allow the entrepreneur to draw knowledge and experiences to the metacognitive level and apply those resources toward the formulation of a metacognitive strategy. Thus,

Proposition 3. The higher an entrepreneur's metacognitive awareness, the greater the reliance on metacognitive knowledge and metacognitive experience in formulating strategies to achieve a desired outcome on the entrepreneurial task.

Proposition 4. For a given level of metacognitive awareness, the greater an entrepreneur's reliance on metacognitive knowledge and metacognitive experience, the more desirable the outcome on the entrepreneurial task.

3.4.4. Step 4: metacognitive strategy

Metacognitive resources serve to inform the development of a metacognitive strategy, which is most simply defined as *one's strategic approach to 'thinking' about the entrepreneurial task at hand in light of the entrepreneur's motivation and the perceived attributes of the environment*. More specifically, metacognitive strategy refers to the framework formulated by the entrepreneur through which to evaluate multiple, alternative responses to processing the entrepreneurial task. For example, for processing a particular task the entrepreneur may typically rely upon a strategy based on a purely empirical, data-driven approach. When this entrepreneur is faced with task in the context of a highly ambiguous situation – one where the data is unclear or unavailable – a metacognitively aware individual will draw upon metacognitive resources to formulate a metacognitive strategy positioned to generate alternatives to the original cognitive strategy (data analysis), such as the use of analogies. Metacognitive strategies define the selection of what is perceived to be the most appropriate cognitive response (based on motivation and the environment), from a set of available cognitive responses (cf Fiske and Taylor, 1991).

Consider an experienced entrepreneur faced with the challenge of deciding the most appropriate avenue through which to secure funding for his or her venture. The entrepreneur has knowledge of various strategies for securing such funding (angels, friends and family, venture capital, etc.), as well as past experiences funding similar ventures. The entrepreneur also has intuitions as to the most appropriate funding source given the nature of the particular venture. This knowledge is enacted through the development of a metacognitive strategy – a strategy for 'thinking about thinking' given the task at hand – focused on the most appropriate cognitive response so as to secure funding for the venture. Our model does not explain which particular cognitive response an entrepreneur will use, other than saying it will depend upon the entrepreneurial context (his or her motivations and perceived external environment), and his or her stock of metacognitive resources. That said, we do posit that the conscious and controlled cognition inherent in the development of a metacognitive strategy is positively related to a desirable outcome for the task at hand. This is because the development of metacognitive strategies in response to a novel, uncertain, and/or dynamic entrepreneurial task, by definition, represents controlled (rather than heuristic-based) processing, allowing for the evaluation of multiple, competing alternative responses to the task. Staw and his colleagues demonstrated that employing a metacognitive strategy is likely to help an individual avoid using the wrong strategy to address a problem given his or her motivations and the perceived external environment (Staw and Boettger, 1990; Staw et al., 1981). Thus,

Proposition 5. The greater an entrepreneur's use of metacognitive strategies, the more desirable the outcome for the entrepreneurial task (relative the entrepreneur's motives and perceived environment).

3.4.5. Step 5: monitoring and feedback

Metacognitive monitoring represents the process of *seeking and using feedback to re-evaluate and adapt motives, metacognitive resources, and the formulation of metacognitive strategies appropriate for "managing" a changing environment*. Flavell (1987: 23) noted that "while a cognitive strategy is simply one to get the individual to some cognitive goal or sub goal...the purpose [of a metacognitive strategy] is no longer to reach the goal, but rather to feel confident that the goal has been accomplished". Monitoring of an entrepreneur's own cognitions can occur both during attention to a particular entrepreneurial task, and also in response to some outcome that results from the decision-making process. Metacognitive monitoring allows the entrepreneur to reflect on how, why, and when to use certain strategies (as opposed to others), given a changing environment and his or her own motivations. For example, one aspect of metacognitive monitoring is recognition of task demands, such as the complexity of a perceived business opportunity. A serial entrepreneur with considerable expertise at identifying and evaluating business opportunities might quickly peruse possible ideas and return to certain ones for in-depth study and analysis, instead of evaluating each idea carefully the first time. After glancing over different ideas, the entrepreneur might notice that one idea for a new business relates to a business idea that he or she had already successfully implemented. This may result in the entrepreneur changing the specific evaluation strategy and delving into the specifics of this idea more carefully, because the entrepreneur is already familiar with the material (monitoring).

Monitoring serves to inform how an entrepreneur perceives the interaction between his or her environment and motivations both *across* and *within* cognitive endeavors. Depending on the cognitive outcome, the performance monitoring mechanism will cue the entrepreneur to re-assess his or her metacognitive knowledge and/or metacognitive experience. Depending on the relation of current performance and an entrepreneur's motives, the performance monitoring mechanism will cue the entrepreneur to re-evaluate his or her motivation (Locke et al., 1984; Nelson, 1996). We expect that the information provided through monitoring serves to adapt and define subsequent metacognition, and lead to subsequent adaptation congruent with a changing entrepreneurial environment and motivation. Thus,

Proposition 6. The greater an entrepreneur's metacognitive monitoring, the more desirable the outcome on the entrepreneurial task.

3.5. A practical example

Consider the owner of a bicycle repair business in the 1970s who finds that every two weeks he or she must undertake substantial repairs to a client's bicycle. If the owner's motive is serving the client's needs and fixing the regular damage, the owner may view the client as atypical, concluding that he is an unskilled and uncoordinated rider. If instead the owner seeks to expand this business, he or she may conclude instead that the equipment is not suited for the demands of the rider. In the latter case, the owner may identify an opportunity to sell bikes that sustain extreme abuse.

Consistent with Loftus (2003), Schacter (1996), and Wyer and Srull (1989), the owner's motives influence the interpretation of his or her external environment. The combination of motivation and the external environment activates the drawing on metacognitive knowledge and metacognitive experience, which in turn directs the use of specific cognitive strategies. For instance, the owner's metacognitive knowledge may lead him or her to develop a general framework for understanding why people buy and ride bicycles — perhaps they don't think about bicycles as mere transportation but as recreational vehicles for exploring natural environments. The owner's metacognitive experience with bicycle design might mean that he or she can use intuition about which of the engineering challenges associated with modifying the frames, wheels, and forks of existing bikes can be made to suit a bicycle as a recreational vehicle (as opposed to mere transportation).

A person's metacognitive knowledge and metacognitive experience direct the use of specific cognitive strategies such as deduction, induction, case-based reasoning, analogical reasoning, or mental simulation. The bicycle shop owner may adopt a strategy of studying related businesses (such as motor-cross motorcycles, all terrain vehicles, and extreme sports) to generate possible business models for this entrepreneurial venture. Cognitively, this strategy would amount to reasoning by analogical transfer (Clement, 1994; Holyoak, 1985), through which a problem is addressed by finding the closest or most similar cases available in memory, comparing and contrasting the focal problem with these cases, and making inferences based on these comparisons. The owner could rethink the metacognitive strategy based on an understanding of how best to explore natural environments and focus instead on high tech toys as status symbols for adults. Another cognitive strategy is to engage in brainstorming with a current client about possible changes in frame, wheels, and forks to develop the product to satisfy his or her needs and then look to satisfy another customer with a similar approach (what Sarasvathy (2001) describes as an effectual strategy). The outcomes of these cognitive strategies provide feedback to the various metacognitive dimensions of our model.

4. Cognitive perspectives of an entrepreneurial mindset

We believe that our situated metacognitive model of the entrepreneurial mindset serves to both integrate and extend previous research tying cognition to entrepreneurial outcomes. To illustrate the advantages of our metacognitive model, in the discussion that follows we refer to a number of influential works focused on the cognitive aspects of entrepreneurial outcomes. We do not claim these works to be representative of the entire breadth of the cognitive perspective on entrepreneurship, but cite them here because each has had a significant impact on the field. Our purpose here is to illustrate the potential contribution of incorporating a metacognitive perspective into the ongoing conversation focused on entrepreneurial cognitions.

4.1. Distinction/extension 1

Entrepreneurial cognition research focuses on differences between entrepreneurs as a function of differing cognitive ability, but assumes relative consistency in cognitive processing within a given individual over time; our metacognitive model explains differences based on cognitive adaptability both within and across individuals, and is positioned to consider such differences over time.

Work on heuristics and entrepreneurial cognition focuses on differences between individuals. Differences between entrepreneurs have been considered in terms of the frequency in which heuristics are employed (Alvarez and Busenitz, 2001), the content of those heuristics (Chiasson and Saunders, 2005), how heuristics are employed given the type of entrepreneurial task or stage of the entrepreneurial process (Bryant, 2007). The dynamic nature of our metacognitive approach extends this research because it also allows for: 1) a focus on how heuristics are informed and evolve based on attributes of the entrepreneurial environment, 2) a focus on the metacognitive process responsible for the selection of a given heuristic, and 3) a focus on explaining differences within individuals across situations as a function of how changing motives may influence why the entrepreneur abandons or adapts a previously learned heuristic. Put simply, why might an entrepreneur's use of heuristics differ over time? Our metacognitive perspective points to four possible explanations: 1) given a constant motivational state, a change in the task could represent a change in contextual factors triggering an individual's metacognitive process and thus, the potential for a different cognitive strategy to be used, 2) given a constant external environment, a change in one or more of an individual's motivational factors could trigger the metacognitive process and produce a different cognitive response, 3) the outcome of a previous cognitive response could provide performance feedback that stimulates a change in motivational and/or environmental factors, which then triggers changes detailed in the previous two points, and 4) the outcome of a previous cognitive response provides feedback information for metacognitive monitoring and change metacognitive knowledge and/or metacognitive experience, which leads to the selection of a different cognitive strategy. By accommodating intra-individual differences in cognition strategies and subsequent entrepreneurial outcomes, a metacognitive perspective allows for richer explanations, such as why people move in and out of entrepreneurship throughout their life-course.

4.2. Distinction/extension 2

Effectual reasoning describes a decision process distinct from causal reasoning, and theory suggests that these disparate reasoning strategies are not mutually exclusive within an individual; our metacognitive model allows for an empirical investigation into why and when effectual cognitive strategies are used, and why and when causal cognitive strategies are used.

Sarasvathy (2001: 244–245) seeks to “identify and develop a decision model that involves processes of effectuation, rather than causation, and showing its use in the creation of new firms... Causation processes take a particular effect as given and focus on selecting among possible means to create that effect. Effectuation processes take a set of means as given and focus on selecting among possible effects that can be created with that set of means”. The selection of causal versus effectual reasoning may depend, in part, on the extent to which an entrepreneur employs metacognitive processes. Although Sarasvathy’s goal is not explaining why effectuation is used instead of a causal cognitive strategy, our situated metacognitive model speaks to this with a parallel approach. Sarasvathy (2001) emphasizes an entrepreneur’s perception of his/her environment, along with motivational factors such as “the desire to make lots of money or to create a valuable legacy like a lasting institution, or, more common, to simply pursue an interesting idea that seems worth pursuing” (244). A dynamic, linear, and independent environment may influence the usefulness of causal or effectual cognitive strategies (251).

A central element of both causal and effectual cognitive strategies is the set of “means” available to the entrepreneur and how those means are employed. Sarasvathy (2001) proposed that “entrepreneurs begin with three types of means: they know who they are, what they know, and whom they know” (250). Our situated metacognitive model of the entrepreneurial mindset suggests that these ‘means’ are organized and acted upon based on metacognitive knowledge and metacognitive experience. Take, for example, the means “whom they know”. One cognitive strategy may be to use one’s network to identify potential new venture opportunities. A metacognitive strategy, however, could expand one’s network or reshape its structure as a new way of identifying opportunities. An entrepreneur might use a metacognitive approach to bring together individuals in his or her network that are otherwise unconnected, so that the synergy of bringing them together yields ideas for new business opportunities. In a sense, awareness of these ‘means’ facilitates the selection of a cognitive strategy – effectual or causal. Thus, differences in metacognitive awareness and the nature of one’s metacognitive resources explain (a) why some entrepreneurs use effectual reasoning and others use causal reasoning and (b) why some entrepreneurs change their cognitive response (i.e., from causal to effectual and vice versa) to accommodate a changed environment or motivation and others do not change.

4.3. Distinction/extension 3

A resource-based view of entrepreneurship proposes that heuristic-based logic is a valuable, rare, and inimitable resource; our metacognitive model offers other “cognitive” resources important in explaining entrepreneurial outcomes consistent with this perspective.

The Resource-Based View (RBV) confers competitive advantage based on the ability to acquire and leverage rare, valuable, and inimitable resources (Barney, 1991, 1996). It has been suggested that decisions as to how to leverage these resources (i.e., in what markets, in what combinations) is a function of the decision-maker’s expectations as to the utility of the resource (Makadok, 2003). The entrepreneurial-cognition-as-heuristics approach argues that heuristic-based logic is a heterogeneous resource which explains, in part, why some individuals make entrepreneurial discoveries and others are less likely to do so (Alvarez and Busenitz, 2001). Our metacognitive model is consistent with this approach suggesting that the metacognitive resources of entrepreneurs are heterogeneous, and thus so is their choice of cognitive mechanisms employed in the pursuit of entrepreneurial outcomes. In effect, metacognitive knowledge and experience may constitute a set of valuable, rare, and inimitable cognitive resources. In addition, metacognitive awareness may have both stock and flow characteristics. Metacognitive awareness may differ across entrepreneurs such that some may generally be more metacognitively aware than others (or may differ within an entrepreneur pre- and post-metacognitive training). In this respect, metacognitive awareness reflects a resource. Furthermore, environments and motivations may influence an entrepreneur’s metacognitive awareness at any point in time and may be transient in nature – and therefore not a resource upon which an entrepreneur can always draw.

5. Discussion and conclusion

5.1. Theoretical implications

Our theoretical framework of the entrepreneurial mindset offers potential insights into numerous outcomes and situations fundamental to the study of entrepreneurship, such as opportunity recognition, entrepreneurial action, new venture formation, firm growth, etc. For example, consider that scholars have long investigated motivational factors to explain why people act entrepreneurially. In a study of entrepreneurial motivation, Shane et al. (2003) categorized previously investigated motivational factors in terms of 1) need for achievement, 2) risk taking, 3) tolerance for ambiguity, 4) locus of control, 5) self efficacy, and 6) goal setting. The authors suggested that research on how individuals’ motives influence entrepreneurial action are suggestive rather than conclusive, primarily because many suffer from significant methodological problems (Shane et al., 2003). That said, our model also highlights that important conceptual issues should be considered. For example, the interactive nature of motivation, cognition, and metacognition is important, but remains largely understudied in an entrepreneurial setting. Our model of entrepreneurially situated metacognition integrates entrepreneurial motivations and environmental-specific factors to offer insights into the development of relevant cognitive strategies, conferring cognitive adaptability given changing motivations and environments. This is not to say that, consistent with Shane (2003), intra-individual differences in motivation are not important in entrepreneurship. What we suggest is that contextual influences are sometimes as – if not more – important in understanding how entrepreneurs process their environments.

Another noteworthy contribution of our model relates to advancing work focused on the role that heuristics play in information processing in an entrepreneurial context. Existing research focused on heuristics in entrepreneurship has increased our understanding of information processing (especially cognitive load, speed, and decision errors). This work has highlighted the decision errors entrepreneurs may commit are due, in part, to their extreme environmental conditions (high dynamism and uncertainty). An investigation of the *types* of cognitive strategies available to an individual could extend the entrepreneurial heuristic research. In a sense, metacognition serves as a psychological mechanism that bridges the divide between the biases embedded in individuals' cognitive mechanisms, and a state of cognitive adaptability that facilitates functioning in a dynamic environment. Metacognition may help individuals compensate for limitations to decision making brought on by heuristics. This compensating effect of metacognition may be especially prominent because the ability to access different cognitive strategies is particularly valuable in the entrepreneurial context. In addition, metacognitive selection of one cognitive strategy over another involves two constructs that have, until now, been relatively ignored in the entrepreneurship literature. Understanding metacognitive knowledge and metacognitive experience helps to open up the “black box” of the entrepreneurial cognition literature – it not only offers an explanation for why people differ in their cognitive strategies, but also why an individual may use different cognitive strategies when facing different contexts and different motivational states and after experiencing different types of feedback. The entrepreneurship literature has not yet incorporated these ideas.

Finally, this research highlights the promise of employing metacognitive awareness in future entrepreneurship research. Early in the development of the domain of entrepreneurship research, scholars adopted a psychological lens to study individual entrepreneurial characteristics (McGrath et al., 1992; Hornaday and Aboud, 1971; Carland and Carland, 1992). However, addressing the utility of that research in entrepreneurship, Shaver and Scott wrote that “not even the most resolute advocate for ‘enduring personality differences between entrepreneurs and non-entrepreneurs’ would argue that a complete map of the human genome will reveal a specific gene that can separate new venture founders from everyone else (1991:32).” More recently, entrepreneurship scholars have returned to their psychological roots to focus on cognitive processes of the entrepreneur (Baron, 1998; Mitchell et al., 2002a; Shepherd and Krueger, 2002), and have argued that cognition represents an important process lens through which to “reexamine the people side of entrepreneurship” (Mitchell et al., 2002a,b). In that spirit we suggest metacognitive awareness may represent an important individual difference measure in entrepreneurship research, however one that differs from the early trait-based research in several important dimensions. First, metacognition represents a dynamic process, rather than a static trait. Second, metacognition can be developed through training (Nietfeld and Schraw, 2002; Mevarech, 1999) and intensified or dampened by the nature of the context. Third, unlike much of the trait-based research, metacognition has been empirically demonstrated to be important in environments like that which entrepreneurs face, where adaptation and reflection are paramount to effective decision-making because of the highly dynamic decision environment (Earley et al., 1989).

5.2. Practical implications

One of the most productive applications of the socially-situated model of metacognition may be opportunity recognition. While fundamental to the entrepreneurial process, as Gaglio and Katz (2001:95) pointed out, “research regarding opportunity identification is in its infancy, and is best characterized as a scattering of descriptive studies rather than a systematic research program of theory testing and development.” Shane (2000) suggested that knowledge influences the discovery of entrepreneurial opportunities. However, Rozin (1976) found that skills and knowledge available and accessible in one situation are not always available in other situations even when they are appropriate, inhibiting adaptable, cognitive functioning. Skills and knowledge become ‘strictly welded to the constrained domains’ (Brown, 1987: 71; Rozin, 1976) in which they were acquired, and therefore are not readily transferable across contexts. Metacognitive mechanisms serve to facilitate the transfer of knowledge from one domain to another (Flavell, 1987). Therefore knowledge within a given domain, as well as a metacognitive awareness of that knowledge, would suggest metacognitive awareness may facilitate opportunity recognition within an uncertain and dynamic context.

Finally, it is also important to consider the implications of our metacognitive model for teaching entrepreneurship. As noted previously, there is considerable empirical evidence that enhanced metacognitive abilities are positively correlated with improved performance on decision task in novel and uncertain environments (Batha and Carroll, 2007). As the content of managerial and entrepreneurial knowledge continues to become obsolete at an ever increasing rate due to advances in technology, communications, and a changing marketplace, incorporating metacognitive training into our pedagogy offers the potential to enhance the student's ability to function effectively in dynamic environments.

5.3. Future research

The effects of metacognition on cognitive functioning and behavior can be classified into three, broad research questions. First, is variance in entrepreneurs' ability to sense, act, and mobilize, relative to some motive explained, in part, by differences in metacognitive awareness or metacognitive resources? For example, is an entrepreneur with considerable metacognitive *task* specific knowledge more likely to achieve a desired outcome (e.g., double digit growth) in a dynamic environment than an entrepreneur with less metacognitive task specific knowledge? Second, how does an entrepreneur combine his or her stocks of metacognitive knowledge (task, people, and strategy) and metacognitive experience (intuition and feelings) to select the most “appropriate” cognitive strategy to adapt to a changing environment? Entrepreneurs with similar levels of metacognitive knowledge and experience may choose different cognitive strategies because they combine them in different ways. Third, given differences in entrepreneurs' ability to monitor cognitive learning and detect inconsistencies between the desired state and the

current state, how are metacognitive strategies informed and adapted? An entrepreneur seeking to understand a particular technology and apply this knowledge to solving customer problems may be unable to attain this goal. Does he or she reflect on what is believed to be true about the technology to inform and re-define the metacognitive strategy? What are the consequences?

One of the most promising aspects of our model is that testing of these questions would not require the development of entirely new measures. Recently a measure of cognitive adaptability based on situated model of metacognitive processing was developed specifically for use in the entrepreneurial context (Haynie and Shepherd, 2009). This inventory is multi-dimensional, and is suitable to isolate specific influences of goal-orientation, metacognitive knowledge, metacognitive experience, metacognitive choice, and monitoring. Sample inventory items include 'My gut tells me when a given strategy I use will be most effective' (metacognitive experience), 'I challenge my own assumptions about a task before I begin' (metacognitive knowledge), and 'I am aware of what strategies I use when engaged in a given task' (metacognitive monitoring).

Along with their various adaptations, these inventories can be employed to investigate the influences of self-monitoring metacognitive strategies on learning (Aleven and Koedinger, 2002), and to explore the relationship between social interaction, beliefs, and the accessibility of cognitive resources (Schoenfeld, 1983). The next step in this work is to relate metacognitive knowledge and metacognitive experience to cognitive adaptability and performance, relative to an individual's motives, across a sample of individuals and situations. Our generalized question #1 then becomes whether variance in entrepreneurs' cognitive adaptability and performance, relative to some motivation, is explained, in part, by differences in metacognitive knowledge and/or metacognitive experience. Again, we can draw upon established experimental research designs from psychology to metacognition through training, and subsequently investigate performance across a range of entrepreneurial tasks given changes in metacognitive functioning.

Although there is work to be done to adapt some of the measures cited above to appropriately consider our situated metacognitive model of the entrepreneurial mindset, such research can build on the solid foundation of existing empirical research. Research designs are likely to be longitudinal, capturing changes in metacognitive knowledge, metacognitive experience, environment, motivation, and outcomes. Further, the study of metacognition is suited to qualitative research, such as in-depth interviews and 'think aloud' protocols.

5.4. Conclusion

Like many entrepreneurship scholars, we are motivated to investigate the influences of cognition on entrepreneurial tasks and subsequent outcomes. However, our approach directed towards that end represents an important departure from the extant conventions of entrepreneurial cognition research. In this article we have suggested that entrepreneurial cognition research is primarily focused on theory development and testing given the role of cognitive processes in *inhibiting* the entrepreneur from realizing marginally 'better' performance across a wide range of entrepreneurial tasks and behaviors. The role of bias, scripts, counterfactual thinking, and even memory and recall – as *framed* in our literature – often represent a 'glass half-empty' approach to exploring the relationship between cognition and entrepreneurial action.

Why is it that entrepreneurs 'think' differently about a given entrepreneurial task (and subsequently behave differently)? By bringing together literatures from social psychology and metacognition to create a situated metacognitive model of the entrepreneurial mindset, we suggest that this difference is not necessarily due to inherent differences in entrepreneurs, but instead the result of differing interpretations of the conjoint influences of motivation and environment which, in turn, may result in disparate cognitive strategies employed to realize a desired outcome. The framework presented in this article represents an important step toward realizing the stated goal of many entrepreneurship scholars; that is 'opening the back box' of entrepreneurial cognition to more fully understand the relationship between cognition and performance in an entrepreneurial environment.

Certainly, for this potential to be realized, empirical approaches to entrepreneurial cognition will need to be altered from research designs typically employed to study phenomena like heuristics and decision biases. However, we are fortunate that the empirical traditions in psychology and education focused on metacognition and cognitive strategies are robust. Incorporating metacognition into existing, cognitively-orientated perspectives in entrepreneurship offers the possibility of studying dimensions of entrepreneurial phenomena that so far have been under-addressed, and thus represent a tremendous opportunity. Nonetheless, these are not unexplored topics, only less studied than other aspects of cognition. We believe that future work on the cognitive and metacognitive processes of entrepreneurs will provide important insights into the knowledge, intuition, and even the creativity of the entrepreneur and penetrate the intangible, human side of entrepreneurship.

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