



Towards a schematic theory of entrepreneurial alertness



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ABSTRACT

This article is an investigation into Kirzner's concept of entrepreneurial alertness – its mechanism and its antecedents. By drawing from decision theory and schema theory, a model is developed to show how changes in the environment are mediated by entrepreneurial alertness and brought to the situated attention of entrepreneurs for evaluation. Entrepreneurial alertness is seen to be the application of unique schemata that allow the entrepreneur to impute meaning to environmental change that would not be imputed by other managers. It is argued that the alertness that allows entrepreneurs to see opportunity where others do not arises from differences in schematic richness, schematic association, and schematic priming. These three antecedents may therefore form a basis on which enhanced entrepreneurial alertness can be developed.

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1. Executive summary

Entrepreneurs play a critically important role in the economy. By spotting opportunities and taking action to exploit them, they drive the process of market production and the fulfillment of social and economic needs. But we currently lack a deep understanding of why some individuals are able to spot the opportunities that most people cannot see. We attribute the difference to a loosely defined quality that Kirzner called “entrepreneurial alertness”. While this has been a useful basis for a considerable body of entrepreneurship research to-date, it is still unsatisfactory in several ways. First, we do not really know what entrepreneurial alertness is – what its psychological basis is, and what its antecedents may be. As a result, we lack a foundation on which to assess this quality in prospective entrepreneurs and to potentially develop or enhance it. Secondly, entrepreneurial alertness has been conceptualized largely in the context of exogenous “discovered” opportunities, where it may be narrowly thought of as simply a perceptual quality. But our understanding of opportunities is now much broader than this and also includes endogenously “created” or socially enacted opportunities where “alertness” has little to do with perception of the external environment.

By drawing on schema theory from cognitive science and integrating it with the strategic management literature on attention and decision-making, I argue that what we call entrepreneurial alertness is not some special quality possessed by rare individuals, but is simply the development and application of a different suite of mental frameworks (schemata) that can be utilized to make sense of the world. Alert entrepreneurs possess and apply schemata that are different than the schemata applied by less alert people. Their schemata are richer in value-creation attributes, they are more strongly associated with internal and external stimuli, and they are intentionally primed for activation in response to even very slight stimuli. The schematic differences that alert individuals have are not innate endowments nor are they static. They can be inculcated and enhanced over time in ways that are understood by educational psychologists.

For those interested in educating future entrepreneurs or enhancing the alertness of existing entrepreneurs, I conclude by outlining how this theoretical perspective may inform the way we teach opportunity spotting. I adapt from educational

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psychology two pedagogical methods that can be expected to foster the cognitive changes necessary to develop a more “entrepreneurially alert” set of schemata. Schematic enrichment may be achieved through inductive schema acquisition using practice with increasingly subtle or diverse cases. Improved schematic association may be achieved through repeated observation of simple cases. Differences in schematic priming may be seen to be somehow connected to entrepreneurial intention and potentially developed through methods for enhancing or motivating intention. But this connection between entrepreneurial alertness and entrepreneurial intention remains to be studied in future research.

2. Introduction

Entrepreneurship research is dominated by the fundamental questions of why it is that only some people see new business opportunities and only some people take actions to exploit the opportunities they do see (Shane and Venkataraman, 2000; Venkataraman, 1997). Empirical observation suggests that individual people can differ widely in their ability to see new business opportunities within a given situation. Some see nothing but constraint and status quo, while others see attractive new opportunities lurking everywhere. The social and economic impact of these differences is enormous, as the economic actions taken by entrepreneurs can have wide-ranging effects on the provision of valued products and services, on the creation and smooth operation of new markets, and on regional socio-economic development. These effects can be observed both for simple imitative entrepreneurship that exploits a temporary arbitrage opportunity in a localized market as well as for disruptive and innovative entrepreneurship that creates entire new industries by destroying that which existed before. Entrepreneurial actions matter in the commercialization of the fruit of R&D efforts, the satisfaction of marketplace needs, and the creation of high-value jobs.

The possibility of realizing these many benefits is contingent upon an individual entrepreneur noticing some change in the world, whether the external environment or the internal sense they make of it, and then discerning within that change an opportunity for value creation. This ability to spot opportunity is the critical first step in the entrepreneurial process. Once spotted, the opportunity may be recognized as essentially complete in itself or requiring additional development and creative acts by the entrepreneur to become an opportunity worth exploiting. Much recent research has been devoted to better understand the diverse range of opportunity types and the corresponding entrepreneurial actions (e.g., Eckhardt and Shane, 2003; Sarasvathy et al., 2005). But these are *ex post* distinctions that only arise once the entrepreneur has already perceived or enacted the initial market need or underutilized resources, recognized a fit between market need and underemployed resources, and created a new fit (Ardichvili et al., 2003). The critical question of the initial discernment and its precursors remains.

Our current best understanding of this phenomenon is Israel Kirzner’s conception of “entrepreneurial alertness” (Kirzner, 1979). While arguing persuasively that this entrepreneurial alertness is the critical economic driver of a dynamic and competitive entrepreneurial process, Kirzner did not attempt to explore the determinants of alertness. And in later work, he explicitly indicates that the antecedents of entrepreneurial alertness remain unclear (Kirzner, 2008) – although the prospect of profits or other value creation is assumed to be the underlying motivation for alertness (Hitt and Ireland, 2000). Early investigations into possible determinants of entrepreneurial alertness have suggested individual cognitive or psychological aspects of the entrepreneur, such as locus of control (Harper, 1998), psychological disposition (Minniti, 2004), personality traits and social networks (Ardichvili et al., 2003), and self-efficacy (Tang, 2008). But the mechanism by which such psychological aspects influence the alertness of entrepreneurs still remains relatively under-explored (Yu, 2001).

This gap in our understanding is important precisely because the social and economic effects of entrepreneurial alertness are so large. The primary contribution of this article will therefore be to suggest a theoretical base for connecting individual cognitive psychology to the entrepreneurial alertness construct and to use this connection to propose three specific antecedents of greater entrepreneurial alertness in individuals. These antecedents will be seen to comprise the richness of the schemata or cognitive frameworks that entrepreneurs employ to make sense of the world (and in particular, the extent to which these schemata include attributes pertaining to value creation), the degree to which these entrepreneurial schemata are associated with particular stimuli, and the degree to which entrepreneurs intentionally prime these schemata for activation.

3. Literature review

Given its critical importance as a central concept in opportunity spotting, entrepreneurial alertness has not received as much research attention as may be warranted. This may be due both to theoretical ambiguity in the term itself and to measurement issues with previous empirical work (Tang et al., *in press*). Part of the theoretical ambiguity is in delineating the boundaries between entrepreneurial alertness and other aspects of opportunity spotting, such as whether alertness includes the evaluation and judgment of what the alertness may come to notice (e.g., Tang et al., *in press*). Part of the ambiguity is also in the nature of opportunity spotting itself, with there being a lively debate recently emerging over whether opportunities have positivist reality or are subjectively constructed (e.g., Alvarez and Barney, 2007). Given this ambiguity around entrepreneurial alertness, there has been even less attention given to its antecedents.

The following review of the literature will start with a discussion of opportunities, to provide a context for the role and importance of understanding entrepreneurial alertness and its antecedents. It will then progress to the entrepreneurial alertness construct, to provide background on the evolving understanding of the nature of this key construct. It will then progress to attention, to provide a linkage between the key construct and its underlying cognitive basis. It will finally introduce schema theory, to provide the specific cognition basis needed for the theory development to follow in Section 4.

3.1. Opportunities

Opportunity is a core concept to the definition of the field of entrepreneurship (Shane and Venkataraman, 2000). Opportunities are central to the creation of new ventures and the social and economic benefits that flow from entrepreneurial activities, whether those are the incremental actions of Kirzner's equilibrium-seeking entrepreneur or the acts of creative destruction of Schumpeter's equilibrium-destroying entrepreneur. It is understandable then that considerable research attention has been devoted to the study of opportunities. Short et al. have outlined how this research has led to an evolving conception of opportunity over the past twenty years that draws from a broad theoretical base (Short et al., 2010). Their review includes description of a changing view of the nature of opportunities (whether discovered or created, existing in a dynamic temporal process, more finely distinguished from neighboring concepts), their antecedents (innate individual differences, observable behaviors), their outcomes (equilibrium-seeking or creative destruction, radical subjectivism), and the moderators of their effects (social structuration, contextual influences, risk and uncertainty).

There has recently been increasing recognition that the initial view of purely exogenous opportunities waiting to be discovered by an entrepreneur may have been overly simple in its assumptions, and that there may be important dimensions to opportunity spotting that involve the development of latent opportunities or even their endogenous creation from nothing (Sarasvathy et al., 2005). The "discovery" theory of opportunities assumes that they arise exogenously from shocks to existing industries and that entrepreneurs differ from others in their ability to notice the resulting objective changes. In contrast, the "creation" theory assumes that they arise endogenously from the enacting actions of individuals and that entrepreneurs are not perforce differently from others in their ability to enact these new subjective realities (Alvarez and Barney, 2007).

It may be that these two perspectives are simply complementary modalities of entrepreneurs rather than competing theories, as has been suggested by previous research based on social structuration (e.g., Chiasson and Saunders, 2005). Entrepreneurs may be able to dynamically switch between algorithmic and heuristic modes of thought to both discover and enact new opportunities (Vaghely and Julien, 2010). In both cases entrepreneurs must be alert to conditions, whether exogenous or endogenous, that support the emergence of opportunities — although the common conception of "alertness" seems to take the more critical realist epistemological stance and therefore may have greater relevance and impact for opportunities that are discovered than those that are created (Alvarez and Barney, 2010).

In the discovery theory of opportunities, alertness provides the entrepreneur with necessary information about objective conditions. This information may pertain to simple arbitrage conditions that present profits for those moving to re-establish economic equilibrium. Or the information may be about technological or market developments that present opportunities to destroy the current equilibrium and to create greater value by establishing a new one. In either case, objective conditions are discovered to have the potential to create value.

In the creation theory of opportunities, alertness still provides the entrepreneur with essential information, but now it is information of a more subjective or constructivist slant. The information may allow the entrepreneur to reconceptualize some aspect of the world or to impute new meaning to existing objective features and, in so doing, to enact an opportunity where none was seen to exist before. As Kirzner remarked, "alertness, in this essentially uncertain, open-ended, multi-period world must unavoidably express itself in the qualities of boldness, self-confidence, creativity and innovative ability" (Kirzner, 1999: 12). It gives the entrepreneur the subjective insight needed "to ignore conventional wisdom (and) to dismiss the jeers of those deriding what they see as the self-deluded visionary" (Kirzner, 1999: 13).

It appears that, regardless of the theory of opportunity that one supports, entrepreneurial alertness is an important dimension of opportunity spotting. So, a review the literature of the entrepreneurial alertness construct will be needed.

3.2. Entrepreneurial alertness

According to Kirzner, entrepreneurial alertness refers to "the ability to notice without search opportunities that have hitherto been overlooked" (Kirzner, 1979: 48), "a motivated propensity of man to formulate an image of the future" (Kirzner, 1985: 56), "an attitude of receptiveness to available, but hitherto overlooked, opportunities" (Kirzner, 1997: 72), or "a sense of what might be 'around the corner', i.e., the sense to notice that *which has hitherto not been suspected of existing at all*" (Kirzner, 2008: 12). These various definitions, while intuitively illustrative, lack an explicit theoretical underpinning. Clearly, though, entrepreneurial alertness is presented as conceptually distinct from the subsequent development of the opportunity, and from the activities undertaken to subsequently exploit the opportunity. And, while entrepreneurial alertness may work in conjunction with explicit environmental information search behaviors, it is more generally a state of mind that is open to opportunities at all times (Busenitz, 1996: 43).

Yet despite this initial positioning as a precursor attitude, the relationship of entrepreneurial alertness to other aspects of opportunity spotting remains somewhat in flux. Some theorists, such as Tang et al. (in press), take a much broader view of alertness. In their view alertness comprises three distinct elements: scanning and search for new information, association and connection of that information with existing knowledge, and evaluation and judgment. Other theorists take a narrow view that precedes most of these activities and reflects Kirzner's comment that alertness is the ability to notice opportunities *without search*; the subsequent activities of making connections and evaluations are important aspects of opportunity spotting and development, but they are not part of "alertness" itself. For example, Gaglio and Katz (2001) invoke schema theory specifically to explain how opportunities may be discovered or enacted in the absence of the scanning and search behaviors that Tang et al. start from.

McMullen and Shepherd (2006) describe how the Austrian school (including Kirzner) assumes cognitive and subjective differences between individuals that allow some to have a more accurate picture of reality than others. As a result, only they can take appropriate entrepreneurial actions within that reality. This suggests that entrepreneurial alertness arises from “epistemological differences (where) only some people ‘know’ what to do” (McMullen and Shepherd, 2006: 137).

Baron (2006) makes the case that this alertness to new opportunities is based on pattern recognition. He argues that what makes an entrepreneur alert is some cognitive capacity to support the recognition that one situation is similar to another in a meaningful way, that at some abstract level the two situations both resemble some common template or cognitive framework. From this recognition of a common pattern, the entrepreneur can make reasonable predictions of the future and can use these to plan new business moves. But Baron’s argument leaves open the questions of what these frameworks are and how they are developed and used.

Entrepreneurial alertness is not solely the domain of the equilibrium-seeking arbitrageur–entrepreneur ascribed to Kirzner, but applies equally to the equilibrium-destroying creative-destruction entrepreneur of Schumpeter (1942). Both types of entrepreneur need to be alert to opportunities, whether in the conditions of the present or in the conditions of the hypothesized future (Kirzner, 2008).

Entrepreneurial alertness is clearly based on paying attention. Before individuals can employ their alertness to discovering opportunities presented by the world or creating new opportunities in the context of the world they must first be paying sufficient attention to what is happening in the world. So, a review of the literature of attention in an entrepreneurial context is now needed.

3.3. Entrepreneurial attention

This perspective on entrepreneurial behavior begins with the individual attending to something of significance in the world, whether an occurrence of change in the external environment (such as technological or economic shifts that have potential to change the value of products and resources in some market (Kirzner, 2008)) or an internal dissatisfaction with the conceptualized current state of affairs and meaning in an industry (such as the pragmatic or moral legitimacy of prevailing practices or the effectual use of available resources (Cliff et al., 2006; Sarasvathy, 2001)). Some of these changes are very subtle, while some are of sufficient magnitude or salience to be noticed by individuals who are paying attention and are immersed in the corresponding knowledge corridors (Kaish and Gilad, 1991; Shane, 2000). These individuals are able to perceive opportunities within these changes or enact new opportunities in response to these changes, and are able to pursue these opportunities through entrepreneurial business actions.

The key roles that individual attention and the perception of difference play suggest an approach based on the psychology of strategic management functions, and particularly that of Herbert Simon (1947). Simon’s view was that the challenge of matching of problems, solutions, and actors within an organization is constrained by the limited attention capacity of individual decision-makers, and that organizations therefore allocate and channel environmental stimuli to the attention of individual decision-makers. While this view was developed in the context of general strategic management in large organizations, it is also the essence of the challenge entrepreneurs face when trying to evaluate new opportunities (Gifford, 1998; Murphy et al., 1991) and to match available means with market ends (Shane and Venkataraman, 2000).

The nexus of interest between alertness and attention is the allocation of stimuli to attention-processing channels. This allocation is constrained both by limitations in cognitive capacity and by structural influences. Of these, the role of cognitive-capacity constraints is relatively well-understood and suggests that the allocation of attention is primarily constrained by bounded rationality and the routines of individual actors (March and Simon, 1958). In a social context, the allocation of attention is also influenced by enactment of social scripts (Weick, 1979) and the loose coupling of the “garbage can” model of organized anarchy (Cohen et al., 1972). The structural constraints, while less well-understood, are generally thought to comprise informal cultural norms that influence the kinds of things individuals are encouraged to pay attention to and formal mechanisms (such as reports and meetings) that the firm uses to guide the attention allocation of individuals (Barnett, 2008). These cognitive and structural factors create a situated attention for the individual that mediates between changes in the environment and the discovery or creation of opportunities to act. So it is at this point where entrepreneurial alertness must arise and come in to play – but a mechanism for the emergence of this alertness has not previously been proposed. This is the point at which schema theory can make a contribution. So, a review of this literature will also be needed.

3.4. Attention and schemata

Human beings use a variety of strategies for dealing with the volume and complexity of sensory information streaming in from the world. One powerful technique is the use of rules, scripts, and categorizations with “slots” to represent real attributes and relationships (called “schemata”) to interpret incoming information and make sense of it (Neisser, 1967). These interpretations are combined with task requirements to create the mental models that people use to solve problems (Gaglio and Katz, 2001).

When faced with a novel situation in the world, we utilize schemata to understand the meaning and relationships among the various sensory stimuli. For example if a stranger is strolling in a park with a furry mid-sized animal on a leash, these characteristics are sufficient to activate a “dog-walking” schema – we recognize the animal must be a dog even if it is of some exotic breed that we’ve never encountered before. We can then use schemata to make predictions about future behaviors, as we can expect this novel dog to wag its tail and give us a sniff or to react in very predictable ways if we extend our hand towards it. The activated

schema stipulates the relationships among its elements (it is the person who is responsible for the well-being of the dog, and not the reverse) and the range of actions that can be expected (we know that the owner will likely be pleased if we pet the dog, but not if we free it from its leash). In a more entrepreneurial example in the same park, if we see a queue of people waiting at a cart or kiosk, and a man busily moving on the other side of the cart, we recognize that he must be a vendor of some sort (e.g., ice cream) and that the people in the queue are waiting customers. We know this even if we cannot see any explanatory signs on the cart and cannot see any goods or money changing hands. From the indicators of the queue, the cart, and the location context, we automatically activate an “ice-cream stand” schema to make sense of what we are seeing. These schemata are particularly useful to us because they reduce the attentional burden of making sense of the world, as this sense-making and prediction of future behavior can happen automatically without conscious effort (Neisser, 1967, 1976). And while some management studies speak of the development or application of schemata at the organizational level (e.g., Rerup and Feldman, 2011), and while cross-level application of theories can be productive when investigating meso-level phenomena like entrepreneurship (McMullen and Shepherd, 2006), it is important to realize that Neisser’s theory of schemata originally postulated operation at the individual level, as a schema is originally a mental construct of a single person’s mind.

Prior research by Gaglio and Katz (2001) has drawn on schema theory to attempt to better understand the phenomenon of entrepreneurial alertness. They provide a strong argument in favor of a role for schemata in the cognitions underlying entrepreneurial alertness, and outline a process in which schemata are involved in all stages of the noticing and evaluation of environmental changes, and in the assessment of whether these changes represent an opportunity — in effect participating in all three components of the Tang et al. (in press) model. But their model assumes that entrepreneurial alertness is a single schema, one which is present in some people and not in others. Those who possess and habitually activate this schema find it becomes chronic and develops a very low activation threshold — they become “alert”. But this assumption of a single encompassing schema may be unnecessarily restrictive if entrepreneurial alertness can be alternatively explained by simply positing small differences in a range of already existing schemata without introducing a special and separate “alertness schema”. Moreover, their research was focused very much on the effects of this cognitive basis for entrepreneurial alertness, and not on its antecedents. If a cognitive perspective can shed light on the antecedents of entrepreneurial alertness, we will gain an improved understanding of the fundamental question of why some people see opportunities when others do not, and insight into approaches that may prove useful in developing increased alertness among prospective entrepreneurs.

4. Theory development

The foregoing review suggests the possibility that differences in the application of schemata between individuals may have a significant role in determining their levels of entrepreneurial alertness. The application of different schemata by two individuals means that they will make different meaning from the same situation. Thus there may be cases where, in response to a change in external environment or internal conceptualizations, some make an “opportunity” meaning while others do not.

Schemata are both situated and individuated — different people may interpret and react quite differently to the same situation, depending on their surrounding contexts and on the content of the schema they apply to the situation. Within the dog-walking context your schema and mine may differ significantly based on our own prior experiences, so our expectations and actions might also differ; if you happen to have been a dog owner, your schema is also likely to be more complex and developed than my naïve non-owner version, making you aware of a greater range of salient details and possibilities.

We might also differ in how a given set of observable characteristics invokes or is associated with one particular schema and not another. The approaching dog in the park might activate in me a schema in which I am likely to pet the dog and compliment it to the owner. But if you have recently been victim of a dog attack, the approaching dog might activate a self-defense schema in which your preferred action is to flee. The activation of a “threat” schema, rather than “pet the dog”, has been primed by your recent experience. Similarly, on seeing the queue for the ice cream stand, someone whose prior experience includes entrepreneurship in the hospitality industry might see the queue as an indicator of market demand for refreshments and begin considerate whether the park is a ripe location for a new patio café — a view that suggests a mechanism for the effects of prior knowledge on opportunity spotting observed by Shane (2000). On the other hand, someone whose prior experience includes political struggles against urban sprawl might instead see it as a wanton intrusion of crass commercialism into an otherwise bucolic place of escape.

What these examples suggest is that differences in observed entrepreneurial alertness are being caused by the application of different schemata to the same stimuli, and thereby the imputation of different meaning to the same situation. Individuals may differ in their entrepreneurial alertness because they have and apply different schemata to the world around them. Therefore, to better understand how individuals differ in their entrepreneurial alertness, it is necessary to understand how they can differ in their schemata.

4.1. How schemata can differ

This section assumes that two individuals have essentially the same set of schemata, and examines how those schemata may differ in their details and in their application in response to the world. It does not consider the case where one individual has a particular schema and another does not, such as when you take a young child into a store for the first time. She, being innocent of any retail knowledge and having no schema for purchasing something, may not have any idea of the roles and expectations of the various people there. She will need to have explained to her that she cannot simply take items from the shelves home, but that she must first take them to the counter, wait for a total price to be calculated and announced, give money and receive change, and

only then be permitted to take the items home. It is a simple script with very few roles and possible action variants, but without it she would have a very difficult time making any sense from the activities of the other people around her. The present theoretical development ignores such cases of schematic differences to focus on cases where both individuals share a schema, but they differ in how rich the schema is, how it has been associated with stimuli, and how primed it is for activation.

4.1.1. Schematic richness

Schemata can differ in richness in two ways. First, they may differ in their granularity, in the fineness with which one schema is distinguished from another. One person may have and apply only a single generic and abstract schema where another person may have two – drawing a subtle but important distinction between cases. For example, students of entrepreneurship initially learn that launching a new venture entails finding a market need, developing a solution for it, obtaining the required resources, and implementing the business plan. Later they learn that opportunity spotting is very different whether one is recognizing existing or creating new, the B2C market is very different from the B2B market, developing a new product is very different from developing a new service, obtaining angel capital is very different from attracting and hiring a new VP Sales, and (most importantly) implementing a business plan is indeed very different from writing it. With this gained knowledge, students refine their schema for new venture creation into a rich and diverse suite of schemata for different situations and contexts.

Schemata can also differ in the richness of attributes they contain. One person may have a schema with only a few roles, relationships, and actions defined, whereas another person may have many more attributes in the same schema. For example, if I naïvely think about the operational requirements of programming for a new software venture, I may simply envision a group of programmers with PCs on their desks. But anyone with experience starting and running such a venture will recognize important distinctions between application programmers, infrastructure programmers, and testers. They will also understand and expect differences between client computers and servers, and between development systems, test systems, and production systems. Their greater experience and knowledge lead them to possess a much richer schema for “software company operation” than my naïve schema.

These examples illustrate the important role that experience and expertise play in the development of richer schemata. Shane's work in observing the relationship between differences in prior knowledge and differences in the entrepreneurial opportunities perceived in one single technology innovation also illustrates the practical impact that differences in richness can have (Shane, 2000). It has been suggested that differences in opportunity recognition between novice and experienced entrepreneurs are due to a developing ability to “connect the dots” through pattern recognition (Baron, 2006; Baron and Ensley, 2006). This pattern recognition may represent the application of cognitive frameworks that include schemata or “prototypes” that are more clearly defined, richer in content, and more concerned with economic attributes relevant to new venture creation (e.g., cashflow potential).

4.1.2. Schematic association

Besides differing in the richness of schemata, individuals may also differ in how they associate their schemata to particular stimuli. Given a stimulus, you might activate one particular schema to make sense of it while I might activate a very different schema. As a result, we may realize very different interpretations of the stimulus, attribute very different meanings to it, and therefore take very different actions in response. For example, entrepreneurs familiar with Drucker's sources of innovation (Drucker, 1985) would be aware that every process must have a weak link and that value-creation potential may be available to anyone who replaces this weak link with something better. These entrepreneurs would therefore have a strong association between the existence of a process and the existence of a nascent opportunity, even if it has not yet been spotted. For them, the environmental stimulus of an operating process (e.g., witnessing a sequence of activities or a hand-off from one participant to another) would be associated with a schema for creating value through finding and replacing the weak link. Another individual, without this association between process and weak link, would fail to discover or enact the potential opportunity. Similarly, some customer-service training programs are designed to establish an association between a disgruntled customer and a market-opportunity schema, rather than just a problem-solving schema – that is, to view the customer complaint not simply as a problem to be solved, but also as a chance to explore the expectations and needs of the market that are not being met.

Such associations come with practice, with repeated exposure to situations where entrepreneurial schemata are activated and applied for sensemaking. It has been shown that entrepreneurs can be trained to become better able to spot patterns that indicate potentially good opportunities (Baron, 2006; Fiet and Migliore, 2001). This training would focus on identifying changes in technologies and markets and would particularly focus on seeking connections and patterns among these changes. Schema theory would characterize this practice as developing schematic associations with the relevant internal or external conditions and stimuli.

4.1.3. Schematic priming

Finally, besides differing in the richness and associations of their schemata, individuals may also differ in how primed for activation their schemata are. Even in situations where you would normally associate and use a particular schema to make sense of the stimulus currently facing you, the activation of that schema appears to have a threshold – if the stimulus is not strong enough the schema will not be activated and you will not recognize it as being a situation of that particular type or pattern, or having that particular meaning. There are two ways around this problem: make the stimulus stronger or make the threshold lower. Since entrepreneurs usually have little influence over the strength or salience of environmental changes, they must seek to lower the threshold. This is the intent of schematic priming. By intentionally keeping the schema actively

in mind, the entrepreneur can cause the activation threshold to be lower and thereby cause the schema to be activated by even subtle stimuli. This effect can be seen in the case of a new technology thought to be “a solution looking for a problem”, or more aphoristically, “when all you have is a hammer, everything begins to look like a nail”. These common expressions reflect how, if you have a schema strongly primed in your mind, even a very small stimulus can cause its activation and thereby shape the interpretation you give to the world. This deliberateness by which schemata may be primed for activation conforms to previous research suggesting a strong cognitive basis for the formation of entrepreneurial intent (Krueger, 2000), it being argued that one mechanism for this cognitive basis is the priming of entrepreneurially relevant schemata.

This theoretical development suggests a model of entrepreneurial alertness based on schematic differences due to the richness of schemata (and the entrepreneurial experiences that created this richness), the association between stimuli and schemata (and the entrepreneurial practice that reinforced this association), and the priming of particular schemata (and the entrepreneurial intention that motivated this priming). Fig. 1 provides a graphical summary of this argument.

4.2. The process of schematic alertness

What emerges from this development is a view in which cognitive and structural constraints produce a situated attention of the entrepreneur in which a set of rich and complex schemata are available to interpret and give meaning to anything that arises, whether externally or internally, and whether as unbidden serendipity or as the result of scanning and search behaviors. If this alert attention is seized by an objective change in external reality, an associated schema is activated to make sense of the change and to support the pattern-matching necessary to discern the potential opportunity discovered. If, instead, the alert attention is seized by a subjective change in internal meaning, an associated schema is still activated to support the sense-making necessary to impute meaning and to discern the potential opportunity to be created. In either case the potential opportunity will still be then subject to additional aspects of opportunity spotting, including evaluation and judgment (Tang et al., in press) and a decision of whether it constitutes and opportunity for someone in general, or for this one entrepreneur in particular (McMullen and Shepherd, 2006).

The entrepreneur, through experience, education, and prior knowledge, develops this set of schemata rich in value-creation possibilities. Through practice and repeated use, these become highly associated with some domain of stimuli. And, through the formation of entrepreneurial intent, these are kept highly primed for activation. Then, in the opportunity-discovery case, the alert entrepreneur notices a relevant external environmental change, such as an available production factor (e.g., new technology) or a changed market need (e.g., demographic shift), which fits a pattern for potential exploitation. And in the opportunity-creation case, the alert entrepreneur is stimulated to change his/her conceptualization of subjective reality and thereby to make a new meaning for it. In both cases it is the application of a particular schema that enables the entrepreneur to characterize reality in such a way that the opportunity becomes visible and takes meaningful shape.

For example, consider again the case of us coming upon the queue of people at the ice-cream stand in the park. Perhaps you, with extensive prior experience in the hospitality and retailing business and currently thinking about launching some new venture or another, will undergo a process as follows. First, your prior knowledge and experience will have given you a richer set of schemata for hospitality and food services businesses, which are more strongly associated with crowds of potential patrons. And your heightened entrepreneurial intent will have primed these and other entrepreneurial schemata for activation. So, on seeing the queue of waiting people, a schema is activated that characterizes them as indicators of an underserved market for refreshment in this area. You “discover” a market-based opportunity and can begin to evaluate the possibility of operating a new patio café in this park.

Perhaps I, by contrast having no expertise in food service but having experience with artistic creation and entertainment performance production, will undergo a quite different process. First, my schemata for hospitality and food services businesses will be relatively naïve and underdeveloped compared with yours, while my schemata for artistic production will be more developed. And, as I am not currently seeking to start any kind of new entrepreneurial venture, my entrepreneurial schemata sit unprimed. So, I might not discover the opportunity that you so clearly see for a new café. On the other hand, my schemata may cause me to conceptualize

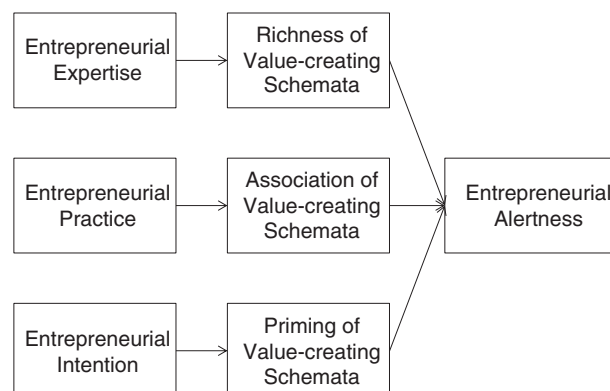


Fig. 1. Schematic influence on entrepreneurial alertness.

the crowd of people not as a queue, but as an audience somehow brought together in a congenial space. I then “create” the opportunity for a new public performance space in the park – an opportunity that did not objectively exist before my schema reconceptualized the meaning of the existence of the crowd in the park.

This process perspective on the application of schemata to entrepreneurial alertness and opportunity identification is a complementary fit to the process perspective proposed by [Gaglio and Katz \(2001\)](#). Their model highlights, first, the unexpectedness of the noticed environmental stimulus and, second, for the unexpected cases, the entrepreneur’s degree of alertness and willingness to look deeply into what is happening (and not simply discount it or assume the unexpected does not really exist). The present model instead highlights, first, the development of the cognitive frameworks necessary to notice the stimulus in the first place and, second, the application of one of those frameworks to make sense of the new world (either objectively inferred or subjectively imputed). This application of a framework, in the form of an activated schema, categorizes information about the world into objects, roles, relationships, and potential actions. It thereby allows the development of expectations of future behaviors. It is these expectations that permit the entrepreneur to determine whether the change is “unexpected” or not, and to know where and how to look more deeply into what is happening. It also permits the entrepreneur to do the prediction of future outcomes necessary to evaluate and judge the opportunity potential in the change.

4.3. Antecedents of entrepreneurial alertness

From the presented model three potential antecedents of entrepreneurial alertness can now be identified and can form the basis of specific propositions for future validation.

4.3.1. Schematic richness

A single schema can differ between individuals by having representation of more attributes or having more complex relationships to other schemata, and in particular by whether it includes representation for common modes of value creation. This difference is sometimes used to explain the differences in how experts and novices perceive situations (e.g., [Chi and Feltoch, 1981](#); [Krueger, 2005](#)). In this view, the specialized knowledge of the expert (e.g., data, relationships, techniques and actions) is represented in the expert’s schemata as additional attributes and connections, as having “richer” schemata than the novice. In the entrepreneurial case, the application of a schema rich in attributes related to value creation results in a different framing of the problem of sense-making and therefore a different salience for some aspects of the situation – it highlights the economic opportunities that the situation may contain. For example, as previously discussed, if a schema for “malfunctioning business process” has representation for “weakest link” then the individual will be specifically attuned to notice the weak link and to consider whether replacing it constitutes an opportunity. But if, for someone else, the schema lacks such an attribute, then that individual will fail to notice the weak link and any associated opportunity. Similarly, an individual is more likely to see opportunity in a new social fad if their relevant schema includes representation for how money was typically made from previous fads. As a result, two individuals exposed to the same stimulus and ascribing the same meaning to it may still differ dramatically in the opportunities they perceive and in the subsequent actions they take. From this the following proposition can be suggested.

P1. Entrepreneurial alertness is heightened by having richer schemata with more explicit representation for potential value creation.

4.3.2. Schematic association

Not only can individuals differ in the schemata that they possess, they can differ in how those schemata are associated with stimuli such as external environmental changes or internal triggers that may drive a process of effectuation ([Sarasvathy, 2001](#)). A given stimulus, whether a noticed change in the external environment or an internal reconceptualization of the status quo, may trigger the activation of one schema or another different schema depending on which schema, through practice, is more strongly associated by the individual with the particular stimulus at hand. It is therefore possible that a shared stimulus will activate a different schema in one individual than it activates in another. Moreover, a schema that is habitually used may become chronic or automated to the degree that it is activated without choice by the individual in response to key attributes of the situation ([Gaglio and Katz, 2001](#)). If the associated schema is one containing attributes for value creation, then it is more likely that the potential opportunity may be recognized. For example, in the earlier example of the ice-cream stand in the park, the initial two observers differ in the degree to which they possess schemata that place positive or negative value on this economic activity. These two individuals, on being exposed to the same environment, differ dramatically in the meaning they ascribe to it and the actions they could take in response. From this the following proposition can be suggested:

P2. Entrepreneurial alertness is heightened by more strongly and habitually associating environmental stimuli to those schemata that have representation for potential value creation.

4.3.3. Schematic priming

Individuals can also differ in the availability and ease of activation of the various schemata they possess and so, whether a subtle stimulus will be sufficient to activate them. This means that two individuals whose schemata are equally rich in value-creation attributes and are equally associated with a particular stimulus may still differ in their ability to be “alert” to the opportunity inherent in a particular occurrence of this stimulus – the individual with the primed schema will have

their schema activated and will recognize the corresponding opportunity of even very subtle stimuli that may be overlooked by the other individual. For example, let us return to the case of us discovering the queue of people in the park. And further suppose that we now have identical expertise and knowledge of the hospitality industry (perhaps we operate two competing cafés elsewhere in the city) and have identical practice in associating crowds of people with the idea of “potential dining patrons”. But let us suppose one critical difference: my café is currently very successful and I am satisfied with my current business prospects, while your café is struggling and you are considering relocating it to somewhere with more traffic. In this case, although we are likely to share identical café schemata and to have them equally associated to the observation of any large groups of people, it will be only you who sees the queue in the park as evidence of potential demand for a new café there — to me it will just be part of the background scenery of people enjoying the park. Your desire and motivation to find a new café location will have primed this schema for activation so that every crowd is immediately seen and interpreted as a group of potential patrons, whereas my equivalent schema is unprimed and is therefore not activated by this same stimulus. In this way, individuals can differ in the degree to which particular schemata have been primed for activation and so, in response to the same stimulus, they arrive at different interpretations. Among entrepreneurs such differences are sometimes referred to as keeping your “antennae” tuned (Gifford, 1998: 483), or looking at world through “opportunity-spotting glasses” — both of which underline the deliberate nature of this priming by the entrepreneur. From this the following proposition can be suggested:

P3. Entrepreneurial alertness is heightened by taking deliberate actions to prime schemata that have representation for potential value creation.

5. Discussion

The model developed above is an attempt to provide a theoretical mechanism for the effects long attributed to entrepreneurial alertness, and to thereby suggest some antecedents for heightened entrepreneurial alertness. I have argued that differences in entrepreneurial alertness can be attributed to differences in the schemata used for sense-making in response to stimuli (whether external or internal). These differences may be in the richness of the schemata that are activated (especially in the degree to which the schemata include attributes for value creation), the strength of association of such schemata with the particular stimulus, and the degree to which the individual entrepreneur has intentionally primed the schema for activation. This model provides a much more detailed and specific description of the cognitive nature of entrepreneurial alertness and its relationship to the attention-channeling of Simon and others, one which integrates prior theoretical perspectives of entrepreneurship, prior knowledge and expertise, experience, environmental scanning behaviors, and entrepreneurial cognition.

5.1. Implications for entrepreneurship education

The foregoing understanding of entrepreneurial alertness as the application of richer, more diverse schemata may have significant implications for the development of alertness and the resulting spotting of opportunities. As noted earlier, schemata are not static for an individual entrepreneur; they are subject to accretion, accommodation, or restructuring in the face of new non-conforming information from the world. An individual schema can be expanded or changed based on the individual's experience with the application of that schema (e.g., new attributes can be added and exception cases can be noted). And sets of related schemata can also be changed through experience (e.g., boundaries among schemata can be redefined, and relationships such as generalization/speciation can be defined or modified). These changes mirror Piaget's view that learning and knowledge development is a process of equilibration between the assimilation of the world into existing mental structures and the accommodation of these structures to any new observations and facts that do not fit (Piaget, 1985).

In particular, an individual entrepreneur can learn to develop and apply schemata that are richer in their attributes and connections, or can learn to associate and habitually activate new and different schemata in response to environmental stimuli. And the entrepreneur can deliberately and intentionally act to prime particular schemata for activation. On all three of these antecedent dimensions, it therefore appears possible for the entrepreneur to learn, develop, and enhance entrepreneurial alertness through strategies of schema modification. The objective of the modifications is to make the shift from the schema of the novice to the schema of the expert — a mental shift that is well-understood in cognitive science (Chi et al., 1982). The schemata of experts can differ substantially from those of novices in being more complex, more parsimonious, more abstracted, and more accurate in data. It may therefore be a goal of entrepreneurship education to assist novice entrepreneurs in changing their schemata to be more like those of expert entrepreneurs.

But herein lies a paradox for entrepreneurship educators. Learning to accommodate new information generally involves applying an existing schema and making accommodations or adjustments where new facts do not fit the existing framework — so the learner must have some pre-existing schema that can be reasonably be applied to the situation. But new entrepreneurs face the tasks of seeing opportunities and potential of things that do not yet exist, for which there may be no applicable schema. So, teaching alertness and opportunity-spotting to prospective entrepreneurs has the unique challenge of trying to impart information to students when those students may not have any applicable schema on which to anchor it. As Carey (1986: 1123) explains it, the paradox is “that to understand something, one must integrate it with already existing knowledge schemata... [and yet] to impart new schemata to replace the student's extant ideas, which differ from the scientific theories being taught”.

Educational psychology can suggest several methods of approaching and resolving this paradox, based on exposing individuals to analogies and inductive reasoning that encourages them first, to acquire new and relevant schemata, and second, to automate the

activation of these schemata in new entrepreneurial situations (Cooper and Sweller, 1987). Following this approach, prospective entrepreneurs would be exposed to several diverse examples of entrepreneurial problem solving (e.g., case studies of successful opportunity spotting) and explicitly told that the example share some underlying similarities. This approach enables them to transfer learning in one case to other cases, and thereby to begin to abstract a new generalized schema (Gick and Holyoak, 1980, 1983; Reed et al., 1974).

Testing and validation of this approach to schema acquisition has yielded some useful guidelines that may be adopted by entrepreneurship educators (Cooper and Sweller, 1987). The development of entrepreneurial schemata is a two-stage process: the acquisition of new schemata, and the association of these schemata to appropriate stimuli. In the first, the induction by which new expert schemata are learned appears to happen very slowly and over a great many examples. So, it may take very much practice before novice entrepreneurs begin to develop the schemata to allow them to be significantly more alert to new opportunities. In the second, the learning of how to appropriately activate these new schemata appears to happen by repetition and observation of more simple cases that do not involve significant cognitive loads. So, the initial schema acquisition should be followed by observation of their activation and application in a variety of simple cases.

The practical implications for entrepreneurship educators interested in developing greater entrepreneurial alertness in their students might therefore be summarized as follows:

Greater entrepreneurial alertness may be taught through extended repetitive practice of structured opportunity spotting (perhaps telling the students “Here is another situation in which a great business opportunity lurks. Can you find it?”), followed by observation of simple cases of opportunity spotting by others (perhaps simple case studies of how opportunities were spotted by successful entrepreneurs and how opportunities were missed by unsuccessful entrepreneurs).

Such an approach can be expected to be successful because it facilitates the acquisition and use of new expert schemata. The prospective entrepreneur thereby obtains schemata that are richer (through abstraction across diverse cases), more associated with environmental stimuli and changes (through inductive invocation), and primed for activation (through repetitive practice). I would argue that these three attributes are fundamental determinants of increased entrepreneurial alertness.

This approach is also consistent with the arguments recently put forth by Baron and Henry (2010) regarding the acquisition of expert performance by entrepreneurs. They argue that the performance benefits of expertise derive from explicitly deliberative practice, not merely from additional experience. This deliberative practice entails intentional prolonged and repeated practice with attentive feedback and self-reflection, and yields enhanced perceptual skills, memory, and metacognition and intuition (in addition to the more basic expanded domain knowledge and skills). In the context of the present model of entrepreneurial alertness, it may be that these additional benefits of deliberative practice are manifestations of the development of richer schemata, the strengthening of associations, and the effects of schematic priming.

5.2. Implications for entrepreneurship theory and research

This article has made an initial theoretical argument towards the identification of three specific antecedents to entrepreneurial alertness. This has been used to develop three propositions for the relationships between these antecedents and the level of entrepreneurial alertness in an individual. Further research will be required to develop these propositions into testable and operationalized hypotheses suitable for empirical verification. If they can be validated, then additional research will be required to develop the practical implications of these for entrepreneurs. In particular, the connection of schematic alertness with educational psychology methods may prove to be a fruitful direction for subsequent research efforts.

The model presented here provides a novel basis for understanding the mechanism of entrepreneurial alertness, one which allows us to begin to investigate its antecedents. The model proposes that differences in entrepreneurial alertness can be attributed to differences in cognitive schemata in their application by individuals. These differences are then argued to derive from antecedent differences in the richness, association, and priming of schemata. The model thus also extends the concept of opportunity discovery and recognition as pattern-matching (Baron, 2006) by suggesting the mechanism by which such patterns are represented in the mind, how they capture the cognitive representation of a situation, and how changing environmental situations can be mapped to existing patterns by the activation of corresponding schemata.

This model therefore contributes a unique focus on the precursors to entrepreneurial alertness by using schema theory to explain the determinants of entrepreneurial alertness. Previous attempts to use schema theory to explain entrepreneurial alertness (e.g., Gaglio and Katz, 2001) have lacked parsimony by positing a novel “alertness” schema, and have been unable to suggest how this schema is acquired or developed and therefore what its antecedents may be. The present theory, which posits only that an existing set of schemata may be further developed, associated, and primed for activation in well-understood ways, provides an improved basis for understanding the mechanisms of entrepreneurial alertness and for exploring its antecedents.

Because this research has suggested three specific antecedents to entrepreneurial alertness, it is an initial step towards contributing pragmatic and theoretically sound recommendations for the development of increased entrepreneurial alertness in individuals. It may be that entrepreneurship educators can begin to draw on the large literature of educational psychologists pertaining to how new schemata may be inculcated, how their association may be strengthened or automated, and how their priming may be developed. This latter point may also prove to be helpful towards ongoing research into the development of entrepreneurial intent.

The argument put forth in this article has three areas of implication for entrepreneurship researchers: empirical testing, integration with other theoretical knowledge, and conceptual extensions to the argument. With regard to testing the model, there are two primary aspects of the argument that must be validated empirically. First, the existence of “entrepreneurial”

schemata must be verified, which is to say that evidence is needed to show that entrepreneurs possess schemata that have representation for value creation, and that when opportunity spotting they associate these schemata with a variety of external and internal stimuli to make meaning of the situation and use the value-creation attributes in their subsequent evaluation of the opportunity. Secondly, the expected correlations between the three proposed antecedents and the resulting entrepreneurial alertness must be observed. Both of these validation exercises will face the challenge of a lack of quantitative measures for schema development and application – a challenge first faced by Piaget in his pioneering research into the development of cognitive schemata in young children. After experimenting with a variety of unsatisfactory research approaches he eventually settled on research designs that used a combination of naturalistic observation and clinical examination (Mayer, 2005). Such qualitative approaches may be similarly required to empirically verify the schemata and cognitive strategies of entrepreneurs making sense of “opportunities” since, as with Piaget’s children, the reliability of simple introspection by entrepreneurs into their cognitive processes has been found to be poor (e.g., Forbes, 2005; Valliere and Peterson, 2007).

With regard to integration with other theory, more work also remains to be done. By drawing upon schema theory the present model also contributes a step towards the integration or synthesis of several diverse theoretical perspectives, including cognitive and structural constraints to organizational attention, effects of prior knowledge on opportunity spotting, observed differences between novice and serial entrepreneurs, and the discovery or creation of opportunities. I have, for example, argued that intentionality matters in entrepreneurial alertness through the mechanism of schematic priming. But I have not addressed the nature of this intention nor its formation. In contrast, the existing literature on entrepreneurial intention is more focused on the antecedents of intention, using perspectives based on the theory of planned behavior (Ajzen, 1991; Krueger et al., 2000; Shapero, 1982). But this literature does not much continue from there to how entrepreneurial intention then becomes manifest in the ability to spot opportunities. Clearly a need exists to connect these two streams of thought. There is also a clear need for further thought about the role of schemata in the human information processing aspects of the pattern matching and inductive learning that entrepreneurs must do when exploring new territories and creating new business opportunities.

With regard to potential conceptual extensions, there are a number of directions in which the present model might be usefully enhanced. For example, a more complete processual view might be developed to better understand the sequencing and dependencies of steps and artifacts within the application of schemata to environmental sense-making and opportunity spotting. In particular, while I have taken a perspective on opportunity spotting that is conceptually broad and inclusive with respect to exogenous and endogenous sources of opportunity, I have taken a narrower temporal view that relates entrepreneurial alertness to only the association/connection stage of the opportunity-development process of Tang et al. (in press), without examining the scanning/search process or the evaluation/judgment process. Schema theory is likely to play a role in these other stages that, while unconnected to the entrepreneurial alertness focus of the present article, is highly dependent on the cognitive processes of the individual entrepreneur. For example, the evaluation of a potential new opportunity requires the future projection of potential value creation and likely costs – which necessitates some cognitive schema or model of a prospective business model and its operating assumptions.

Further research is also needed into the processes of change and evolution of entrepreneurial schemata. Schemata are not simple static entities, but are constantly being updated in the face of new information about the world. In particular, when some phenomenon does not accord with our existing schema we must make some changes to incorporate this new reality, the extent of which depends on how fundamentally the new phenomenon disagrees with our existing schemata. If the change is very minor, it can be assimilated through simple accretion of new attributes of a schema. If the change is more substantial it may be necessary to make a more substantial accommodation or tuning of several related schemata. And if the change goes to the root of a schema a complete restructuring of it and related schemata might be necessary. Such changes must be common for entrepreneurs exploring new business potentials and reconceptualizing existing resources and production factors. But the process by which entrepreneurs initially use existing schemata for novel sense-making but then update these schemata in the face of newly learned information is not yet well-understood.

5.3. Limitations

The present model provides a cognitive basis for understanding differences in entrepreneurial alertness among individuals. But it is simple and somewhat limited in its current form. The three proposed antecedents are argued to be contributors to increased entrepreneurial alertness, but they cannot be considered the sufficient and complete set of preconditions for alertness and opportunity spotting. They are precursors to changes in alertness, but are not to be considered as sufficient cause for the original baseline level of alertness. The argument of this paper has assumed the situated and constrained attention of decision-makers, as discussed by Simon and others. Schemata are a way of making meaning out of noticed changes – but these changes must first be noticed. Thus the level of entrepreneurial alertness can also be changed by additional factors that influence the general level of attentiveness and cognitive capacity of the individual. The role of attention in entrepreneurship (how much, how sustained, how allocated) is currently insufficiently developed in the entrepreneurship literature. This model is therefore somewhat limited in its scope in that it assumes the presence of the entrepreneur’s situated attention to apply schemata to information about the world. But it omits any explanation of how that situated attention came to be, and what relevance this may have to the selection of schema when more than one schema may be activated by the same environmental stimulus.

While the three antecedents of the model are not in themselves sufficient to ensure heightened entrepreneurial alertness, they do appear to be individually necessary, as can be demonstrated by considering the hypothetical absence of each. Schematic richness is essential to the understanding of the existence and nature of the value-creating potential of a particular situation.

If your schemata were not rich, particularly in value-creation attributes and relationships, then you would fail to apprehend or enact the opportunities that may be latent before you. In such a situation you would be able to function effectively in a stable environment but would be unable to recognize and respond entrepreneurially to changes. Schematic association is essential to choosing advantageously from among competing possible interpretations of a particular situation. If your schemata were entrepreneurially rich but were not strongly associated to stimuli they would not become activated, and instead you would interpret the world using some other schema that did not alert you to the potential for value creation. Thus, while you could be said to possess broad theoretical knowledge of opportunities, you would be unable to apply this knowledge to the real world; you would recognize opportunities only after they have been seized and exploited by other entrepreneurs. Schematic priming is essential to competitive success in a market for the most attractive opportunities inherent in a particular situation. If your schemata were rich and appropriately associated but were not primed they would lie dormant for all but the very strongest stimuli. You would be able to recognize or enact some new opportunities, but only those that were so clear and obvious that they would likely have attracted many other entrepreneurs as well. Your ability to be a market leader or first mover would be severely impaired by your inability to notice the more subtle opportunities before they were noticed by others.

As suggested in Section 5.2, the model is also limited in that it assumes that entrepreneurially relevant schemata are those with slots or representation for value creation, without specifying what those might be. It currently omits details of how entrepreneurial knowledge of value creation might be represented in schemata, and therefore neglects any possible effects that this representation method might have on the way in which such schemata are associated, primed, and applied to sense-making. In effect, the model has assumed that the three antecedent factors operate independently without interaction effects. This might not be the case. For example, one might argue that the intentionality of priming a particular schema will not only have the effect of lowering its activation threshold, but also of changing the strength of its association with various stimuli, or even of modifying its data attributes and thereby changing its richness.

Despite these limitations, the generalizability of the model is likely to be very good, as it rests on a widely supported basis from cognitive psychology. It makes very few assumptions about the cognitive functioning of the entrepreneur other than those of a normal, psychologically healthy individual.

In conclusion, this article has attempted to shed light on the nature of entrepreneurial alertness by adopting a cognitive perspective that draws from schema theory. It has argued that entrepreneurial alertness is the application to environmental changes (whether objective or subjective) of those schemata that have representation for entrepreneurial action and value creation. The application of these schemata can vary from one individual to another because people do not all have the same set of schemata, their schemata do not have the same detailed elements and relationships, and the same schemata are not necessarily activated to make sense of any given situation. This research therefore proposes that schematic richness, association, and priming are antecedents to entrepreneurial alertness because these factors control which schema gets activated to make sense of the situation, and which meaning is therefore ascribed to the situation. Entrepreneurial alertness may thus be enhanced through strategies of schematic development that enriches the schemata and strengthens the association and priming of entrepreneurially relevant schemata, as illustrated by the acquisition of expert knowledge. Such developmental strategies should have the effect of increasing entrepreneurial alertness and thereby addressing the fundamental questions of why it is that only some people see new business opportunities and only some people take actions to exploit the opportunities they do see. Through greater development of entrepreneurial schemata it may be possible to better understand and influence the supply of these critically important individuals.

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