What Lies Beneath? The Experiential Essence of Entrepreneurial Thinking

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Cognitive developmental psychology and constructivism offer possibilities for the future of entrepreneurial cognition research to explore: (1) deeply seated beliefs and belief structures that ultimately anchor entrepreneurial thinking and (2) how they change as entrepreneurs move toward a more professional, expert mind-set. Such insights aid the field in identifying those developmental experiences that are the sources of those critical deep beliefs intrinsic to our mental models regarding entrepreneurship. As a field, entrepreneurship is lauded for the effectiveness of its teaching, and this essay offers strong theory to explain that our pedagogical best practices reflect important, well-known cognitive phenomena.

Introduction

What is the essence of being "entrepreneurial?" The field has explored related questions from many perspectives, but one recurring insight is that the successful entrepreneurs can be characterized by an expert mind-set. However, K. Anders Ericsson (e.g., Ericsson & Charness, 1994) has shown that while some individuals move from novice to expert, others do not. And, that change manifests itself in significant changes in deep cognitive structures. If that is true, then it is vital for the field of entrepreneurship to learn as much as we can about what differs in the deep cognitive structures of expert entrepreneurs (maps, scripts, schemas, etc., and the deep beliefs and assumptions driving them). This essay offers some insight into this quest.

It is also important to gain a better understanding of how such deep structures evolve. As this understanding grows, our ability to help entrepreneurs grows in parallel. One key implication of Ericsson's work is that experts, including entrepreneurs, are definitely made, not born. There may be some innate "hard wiring" but expertise appears to be learned. The research also indicates that experts consistently and reliably follow recognizable, if highly complex, cognitive behaviors and processes (e.g., Baron & Henry, 2006; Mitchell, 2005). Consequently, if we want to understand entrepreneurship, it is vital to understand how one becomes an expert entrepreneur. The evidence indicates that the content of an expert's knowledge base need not differ from that of a novice, but experts typically organize or structure the content differently. This begs the question concerning

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how expert entrepreneurs structure their knowledge. I believe that to answer this question, we must first identify the deep beliefs that anchor and shape knowledge structures (e.g., maps, scripts), which in turn influence knowledge content.

Furthermore, studying deep beliefs is important because such beliefs play a pivotal role in what we perceive as relevant in new knowledge, how we process stimuli and information, and finally, how we store and structure the knowledge resulting from these steps. Yet, most of us are unmindful of our deep beliefs or their impact on the ways we perceive, think, and feel. I also believe that examining deep beliefs affords us the opportunity to better understand entrepreneurship because:

- Behind entrepreneurial action are entrepreneurial intentions;
- Behind entrepreneurial intentions are known entrepreneurial attitudes;
- Behind entrepreneurial attitudes are deep cognitive structures;
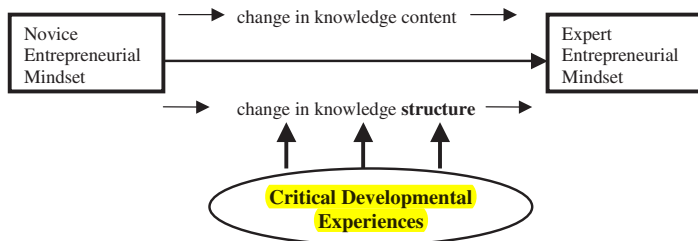- Behind deep cognitive structures are deep beliefs.

In any complex domain, how we *structure* our "expert" knowledge and skills also evolves. People connecting the same "dots" may connect those dots very differently from one another, but they will also connect them differently as they become more expert in that domain (Baron, 2006; Baron & Ensley, 2006). The growing interest in social neuroscience reflects the desire among scholars and practitioners alike to understand how we structure knowledge at a very deep level (Andreasen, 2005; Cacioppo & Berntson, 2001; Cacioppo, Berntson, Adolphs, Carter, Davidson, McClintock et al., 2002; Insell & Fernald, 2004).

I have defined "beliefs" here as deeply held strong assumptions that underpin our sensemaking and our decision making. Philosophers have long argued that not all beliefs are created equal in importance. That is, some beliefs are deeper than others; some beliefs build upon beliefs that are deeper still. I argue then that if we are to truly understand the critical aspects of the deep belief structures of expert entrepreneurs, scholars must mindfully explore at deeper and deeper levels.

This essay opens with a focus on how we acquire deep beliefs. To do this, I present a brief overview of the constructivist learning framework. From there, I integrate cognitive developmental psychology and the role of constructivistic learning on cognitive development of deep beliefs, knowledge content and structure, and use examples of entrepreneurship relevant research where possible. I then proceed with an example of one of the most important deep beliefs that should be of great interest, that is, role identity; and from there address both implications for entrepreneurship pedagogy and for research and future direction. Figure 1 suggests the basic premise: As individuals move from a more novice entrepreneurial mind-set toward a more expert mind-set, that movement is reflected in

Figure 1

Constructivism and Entrepreneurial Cognitive Development

significant changes in deep cognitive structures, punctuated by critical developmental experiences.

Deep Beliefs: Behaviorist versus Constructivist Models of Learning

Educational theory has for some time demonstrated there are two fundamental models of how humans learn—and these models offer rather different prescriptions for teaching and training (Brooks & Brooks, 1993; Hamilton & Hitz, 1996; Perkins, 1994). The traditional model is *behavioral* in nature and focuses on acquiring information, whether the information entails specific facts or the framework in which learners use the facts (usually derided as the "memorize and regurgitate" model). Here, a person learns a fact and that fact's place in their knowledge structures—until they learn a new fact that displaces the former one.

The *constructivistic* model, on the other hand, assumes that humans construct knowledge structures that continue to evolve. The model assumes that learning is highly situated in the ambient conditions of the learning and in the multiple influences of the social setting, as shaped by deep belief structures. As such, it becomes important for learners to understand the deep cognitive changes that are underway, and it is equally important for instructors to understand (if not embody) the expert mind-set. Under the behaviorist model beliefs evolve through the acquisition of new facts that update or displace the old, much like "find and replace" in a word processing document. Under the constructivist model, the acquisition of new knowledge also forces a change in how we organize or structure the information content. This highlights an important cognitive process: To advance a learner's knowledge always requires confronting significant discrepancies and contradictions. But, don't we want to nurture reflective practitioners (Jack & Anderson, 1999)?

Prior knowledge, assumptions, and beliefs may prove problematic, even dysfunctional, if not confronted in a constructive manner. The constructivistic approach, therefore, offers explanations both for how structures evolve as well as specifies the mechanisms individuals use in order to confront and resolve discrepancies and contradictions in their constructed knowledge base. Consider the parallel of Kuhn's notion of "paradigm." As problematic, even dysfunctional information accumulates, a scientific field adapts its paradigm to accommodate this disconfirming information until it can no longer do so. Ultimately, the field must construct a new paradigm. For individuals, there comes a moment when their deep cognitive structures and the deep beliefs that anchor them must change, often dramatically, and the constructivist view accounts for this.

Ultimately, the constructivist approach to human learning enhances learning how to learn, as students move from changing their deep cognitive structures to a metacognitive capability for understanding the changes they are making and the changes they need to make to become more expert. Having a strong sense of how they "connect the dots" affords human beings the ability to direct their own learning. For example, evidence suggests that entrepreneurs, especially successful (expert) ones, have above-average skills with respect to self-directed learning (Guglielmino & Klatt, 1993).

Probably the most recognizable constructivist phenomenon in entrepreneurship is the identification and shaping of personally relevant opportunities (Bouchhiki, 1993; Gaglio & Katz, 2001; Gaglio, 2004) and at the heart of entrepreneurial intent (Bagozzi, 1992; Krueger & Brazeal, 1994; Krueger, 2000; Krueger, Reilly, & Carsrud, 2000). Even more interestingly, is that entrepreneurship education has long owed its success to implicitly following the constructivistic model (shadowing, living cases, etc.) that appeals to and shapes deep belief structures. Today, entrepreneurship pedagogy has become even more

Table 1

The Evolution of Modern Pedagogy: A Simplified View

Key focus of pedagogy	Key assumption	Example of key tool
Teacher-centered	Teacher transmits to passive students	Memorization (lectures on entrepreneurial facts)
Teaching-centered	Recognizes learning as a process	"Skills & Drills" (e.g., writing business plans)
Learner-centered	Learners have "ownership" of learning	Case studies (e.g., assessing business plans)
Learning-centered	Learning is situated, students & teacher alike	Problem-based learning (e.g., self-managed field projects)

constructivistic by explicitly focusing on expert scripts, explicitly teaching "uphill" counterfactual thinking (Saks & Gaglio, 2004), explicitly compelling students to be self-directed learners—and then forcing them to reflect on their learning (e.g., Morse & Mitchell, 2005): Not what one finds in traditional management education programs.

Table 1 offers a simplified view of how modern pedagogy has evolved. As one moves down the rows of the table, the theoretical basis moves from purely behaviorist (teacher-centric) to purely constructivistic (learning-centric). In any academic setting (and in any learning situation) there is a mix of approaches. However, the emphasis on rote learning has declined as we have learned more about how humans learn. There remains a strong focus on teacher-centric education, though across the age span we have seen that tempered by the recognition that learning is a dynamic process. Also, it is comforting for many to focus on simple transfer of knowledge content and skills: We know if we know the material, we know if we have acquired the skills. However, knowledge and skills acquisition are insufficient if we do not know how (and when and where) to deploy them.

Consider the difference between a well-structured problem and an ill-structured (even "wicked") problem. In the former, we have a good sense of what knowledge and skills are involved; in the latter, we must identify what knowledge and what skills are needed, contingent upon what approach(es) we take to that problem. In more recent years, educators began to assume that learning was the responsibility of the learners; teachers do not teach *per se*, instead they facilitate learning. Most recently, the success of constructivistic methods has guided much pedagogy toward a truly learning-centered focus. However, teacher-centric and teaching-centric teaching methods remain widespread, a reality that may not be supportive of the more complex learning needed to become an expert—especially an expert entrepreneur.

Constructivistic methods tend to appear primarily learning-centric; this reflects current cognitive psychology tenets about how humans *actually* learn in daily life: by trial and error in a social setting. Therefore, if one wishes to change deeper cognitive structures such as scripts, then it is imperative to focus on teaching methods that focus on knowledge structure, not just knowledge content—e.g., constructivistic. For example, consider Bandura's (1994) social learning theory which does not use the label but is constructivistic in nature as it posits learning as an iterative change process where deeply held beliefs and attitudes coevolve as learners actively acquire, process, and organize new knowledge and implies new tools that facilitate that.

As suggested earlier in this essay, scholars can work backwards from intent, by understanding the key attitudes that are antecedent to intent, then identifying those beliefs that (1) drive those antecedents, and (2) influence the impact of environmental cues on

those antecedents. Identifying deeply held beliefs, especially where they are not obvious to the individual holding them, will be quite useful—for practice as well as for research. However, if scholars can take the additional step of identifying where and how those beliefs were generated, we can better replicate those entrepreneurial beliefs in students and trainees (e.g., Neergaard & Krueger, 2005).

Cognitive Development

If we accept that human learning is inherently constructivistic, it becomes critical to not only understand the deep knowledge structures of an expert, but even more critical, to understand how they develop and change. If we are to help individuals to grow as entrepreneurs, it would help to have a stronger grasp of the trajectories by which expert entrepreneurs grow.

Deeply held beliefs are learned and relearned over time, but are typically anchored on some initial belief that makes them difficult to change (e.g., Krueger, Kickul, Gundry, & Verma, 2006). If we are not even aware of these deep beliefs, change is even more challenging. Short of something akin to a religious epiphany, to change these deeply seated assumptions requires a great deal of time and effort. Therefore, the first task is metacognitive, to surface these beliefs. Being fully aware of certain of deep beliefs makes it much easier to question and modify them. Typically, change in belief tends to be incremental.

However, here is the paradox: There are circumstances where one finds a discontinuous change in belief occurring seemingly overnight. Religious conversion is the cliché example, but humans can find that certain experiences can have a transformative impact. Developmental psychology calls these "developmental experiences" that need not change *what* we know, but rather changes *how* we structure that knowledge (e.g., "a new way of looking at the world"). As we move through life stages, we can only move on if we work through a certain "crisis" (Erikson, 1980).

To work through that "crisis" requires exactly that kind of developmental experience. Erikson (1980) maps out the stages and crises between them and the typical developmental experiences required. We should be able to identify a parallel roadmap for growing expert entrepreneurial thinkers. Better still for our purposes, Erikson and others show developmental experiences need not be as profound as religious conversion or a midlife crisis when considered in light of the constructivist learning model—which asserts that developmental experiences are absolutely central to how humans really learn, as they serve to change how we structure our knowledge.

Cognitive Developmental Influences

One advantage of exploring developmental experiences is that it affords us the potential ability to recreate those experiences, if not the lessons learned from those experiences. Ericsson and Charness (1994) argue that becoming an expert requires considerable "deliberate practice" at activities directly related or adaptable to the expertise in question. Understanding the mind-set of an expert should help accelerate the process; understanding how that mind-set evolves should help even more, especially the role of anchoring beliefs. Fortunately, cognitive developmental psychology offers us some useful starting points.

Scholars of human development such as McClelland, Piaget, and Erikson would also argue that important early life experiences, to some degree, mold future attitudes, intentions, and personalities by providing developmental experiences (Bronfenbrenner, 1986;

Elder, 1974; Elder, Pavalko, & Hastings, 1991; Erikson, 1980; McClelland, 1965). McClelland (1965) suggests entrepreneurial behavior is fostered by early exposure to achievement-oriented imagery. He found tenuous links between achievement imagery in children's stories in a location and subsequent economic development. On the other hand, developmental psychologists agree equally that experiences are less important than the lessons learned from them (Carsrud, Gaglio, & Olm, 1987; Elder et al., 1991; Erikson, 1980; Stern & Stone, 1990).

Consider the example of growing up in a family business. Human cognitive development does not occur in a vacuum; indeed, it is firmly and inescapably embedded in a highly complex social context (Bronfenbrenner, 1986). This includes family and family-like settings, explaining the developmental psychologists' fascination with family business (Kaslow, 1993). We have hints that growing up in a family business should provide the possibility of a *de facto* business education, both good and bad and "merely" different— that is, potentially developmental (Iannarelli, 1992; Monroy, 1988). Particularly relevant to my argument here, Iannarelli found growing up in a family business gave women unique developmental experiences regarding entrepreneurship (relative to women who did not). Existing research (Delmar & Gunnarsson, 2000; Laferre, 2001; Stavrou, 1999) suggests a positive role for family firms leading to more positive attitudes and intentions toward self-employment or transfer of human capital (Lentz & Laband, 1990). However, entrepreneurship has its "dark side." Kets de Vries (1993) vividly illustrates pathologies that both cause and are caused by life in a family business. It is thus equally important to identify those developmental experiences with negative consequences for psychosocial development or simply for attenuating entrepreneurial attitudes and intentions.

While early life experiences seem to play a key role, other experiences in life (family, work, sports, etc.) offer important developmental influences. Life experiences are very strong predictors of vocational preference (e.g., Smart, 1989; Lent, Brown, & Hackett, 1994). Work experiences have proven central to successful managerial development, as successful top executives tend to share certain key experiences that proved to be of considerable importance to their development (McCall, Lombardo, & McCauley, 1988). McCall's team found that one can take away a highly positive, developmental lesson from even a horrific experience, while one can just as easily take away the wrong lesson from a highly positive experience. Thus, while scholars need to identify critical developmental experiences, it is the *lessons learned* that are of paramount importance. These are the source of deep beliefs that anchor the newly formed deep cognitive structures.

Furthermore, individuals acquire biases toward how they make causal attributions. Attributional style pervades many important life decisions and persists through life (Seligman, 1990). Entrepreneurs' biases toward internal control attributions are well documented (Gatewood, Shaver, & Gartner, 1995). This belief in control over one's own destiny can be acquired at an early age (Seligman, 1990). Children of entrepreneurs, particularly successful ones, may learn to make more internal attributions of causality. Self-employment may also result from negative events; again consider Kets de Vries' (1993, 1996) "dark side" of entrepreneurship. Shapero and Sokol (1982) talked about how displacement can leave individuals perceiving only self-employment as a feasible option. It also suggests that deep beliefs and changes in them may differ between necessity entrepreneurs and opportunity entrepreneurs. What all this tells us is that our search for deep beliefs and their origins should consider both the positive and the negative.

Beyond causal attributions, Lent, Brown, and Hackett's (1994) comprehensive model of career preferences, intentions, and decisions reflects a large body of research that identifies certain other key leverage points in the career decision process. In particular,

self-efficacy looms particularly large—something that entrepreneurship researchers have long noted (e.g., Krueger, 1993a) as well as scholars of self-efficacy (e.g., Bandura, 1986). We also have evidence that experience with, and even vicarious exposure to, entrepreneurial activity can make a difference (Krueger, 1993b). Peterman and Kennedy (2003) found participation in "youth enterprise training" significantly influenced entrepreneurial attitudes and intentions. Moreover, they found that the students' perceptions of the training experience (positive or negative) also had a material effect. Similarly, we see evidence that even university courses can affect critical attitudes such as entrepreneurial self-efficacy (Cox, 1996; Krueger, 2001; Mitchell & Chesteen, 1995; Mitchell, Smith, Seawright, & Morse, 2000).

In sum, it is becoming increasingly clear that attitudes and personality traits, once thought to be stable, in fact evolve over time, particularly during and after important life events (e.g., divorce, combat, or the Great Depression [Elder, 1974]); and these impacts play a meaningful role in career intentions. However, if even a college course can have some impact upon attitudes, beliefs, and personality traits, it seems more than plausible that critical developmental experiences will also make a difference in the deep beliefs that lie beneath entrepreneurial intentions and antecedent attitudes. If so, we gain a new insight into the cognitive processes that drive the evolution of entrepreneurial thinking.

Applying Constructivism to Cognitive Development

I have already argued that studying the impact of growing up in a family business should prove both fascinating and illuminating. The traditional approach from developmental psychology has been to simply compare those exposed to family business to those who have not. No matter how complicated, no matter how subtle the effects might be, a simple comparison should yield significant findings as we are typically dealing with large effect sizes. As such, a pilot study offered a simple comparison of subjects who report having grown up in a family business to those who do not report such history and were facing imminent career and whether they found the experience to be positive or not (Krueger, 1993b). Pilot study results argue that growing up in a family business seems at least as powerful as did the 6-month training program assessed by Peterman and Kennedy (2003).

Consider the famous maxim of Epictetus: "*Experience is not what happens to you, experience is what you do with what happens to you.*" We therefore need to consider how individuals process their experience. Whether that experience was positive or negative, scholars still need to take a deeper look into what they have learned—at a deep level. While exposure to entrepreneurial activity seems to matter, the adjudged quality of that experience is clearly at least as important (e.g., Krueger, 1993a). However, we need to go even farther. As I have discussed earlier, if we are to find useful insights into how entrepreneurs learn to think entrepreneurially, we need to move to a deeper cognitive level. We need to use semantic-level phenomena as markers for an expert mind-set and use those to explore how deep knowledge structures are changing. To understand and assist the development of entrepreneurs as expert professionals, we need to devote significant attention to how expert entrepreneurial thinkers structure and learn to structure their knowledge, tacit or otherwise.

Still, this begs the question of where to find clues to identifying critical deep beliefs. Let us therefore examine more closely a construct that visibly reflects important deep beliefs: role identity.

Role Identity: How Deep Beliefs Matter

Entrepreneurial Role Identity: Seeing Oneself as an "Entrepreneur"

Let us examine one manifestation of deep beliefs, that of role identity. Understanding perceptions plays a critical role in understanding entrepreneurial activity (Shaver & Scott, 1991). Role identity is a central entrepreneurial perception that we as a field have yet to address in greater depth: the entrepreneur's perception that "I *am* an entrepreneur." In many career fields, individuals may have a limited, even distorted mental model of what that career entails in terms of role demands. For example, education students might choose whether or not to be a kindergarten teacher based on their mental model of the prototypical (or the optimal) kindergarten teacher. As that mental prototype is usually based on vague memories of one's own kindergarten teacher, it is at best too narrow and at worst quite distorted. Potential entrepreneurs may be deterred or attracted to entrepreneurship from similar mental prototyping, a cognitive phenomenon related to categorization (Jelinek & Litterer, 1995; Krueger & Hamilton, 1996).

As individuals experience entrepreneurial training, their attitudes and intentions toward entrepreneurship tend to change significantly (Krueger, 2001; Peterman & Kennedy, 2003). Learners should also change at a deeper cognitive level such as in their scripts (Gaglio & Katz, 2001; Mitchell, 2005; Mitchell & Chesteen, 1995). Triangulating role identity with quantitative measures of entrepreneurial intentions and attitudes would therefore seem fruitful (Krueger, 2000). It should also enhance the identification of critical developmental experiences.

Research into Role Identity

"Role identity" and related constructs such as "self-identity" and "perceived role demands" have been studied in entrepreneurs at a cursory level. One striking exception is McKenzie's (2003) dissertation that essentially posits that entrepreneurial activity is, in a very real sense, part of developing one's self-identity. Role identity is socially constructed from whatever evidence that the individual has. We have a surprisingly detailed mental picture of who fits a role and how they fill it, even if it is based on very limited or even inaccurate information. Students will have a mental prototype of "entrepreneur" that may be depressingly dysfunctional or at least limiting (Krueger, 2003b).

Consider John Motley, head of the National Federation of Independent Business and champion of entrepreneurship, and Robert Reich, Secretary of Labor and an avowed skeptic of entrepreneurship. Both grew up in a family business. Allegedly, however, Reich's father was unsuccessful, unhappy, and treated his employees badly. Motley had a much happier experience. If true, is it any wonder that they have such different role identities? (And even if apocryphal, the story still offers great resonance to the topic at hand.)

Research into the formation of role perceptions in entrepreneurs include analysis of how entrepreneurs become socialized (Neergaard & Krueger, 2005; Starr & Fondas, 1992) and a model of entrepreneurial formation that explicitly considers role perceptions (Naffziger & Hornsby, 1994). More recent studies that address entrepreneurial role perceptions include Delmar (2000), Autio, Keeley, Klofsten, Parker, and Hay (2001), and even research suggesting that local values and beliefs are critical (e.g., Davidsson & Wiklund, 1997; Dana, 1995). These latter studies position role issues in the context of entrepreneurial intentions and attitudes (and the formulation thereof). Some recent research (Kickul, Wilson, & Marlino, 2004) looks at differences in entrepreneurial self-efficacies in underrepresented groups, finding evidence that shortfalls in self-efficacy can

be traced partly to differences in socialization in entrepreneurial role identity, for example, among young women and women of color. Recall the vocational psychology literature has long shown that gender and ethnic differences in career intent and choice are often completely explained by differences in relevant self-efficacies (e.g., Lent et al., 1994).

Several other studies have also delved deeply into the genesis of entrepreneurial role perceptions. For example, Kets de Vries (1996) applied a psychodynamic approach to a case study of "Mr. X," an entrepreneur, finding that entrepreneurial role perceptions (not just entrepreneurial motivations) can derive from early life experiences, often negative ones. On the other hand, Krueger (1993b) found that exposure to a family firm had, on balance, positive outcomes. Nonetheless, in both cases it appears quite likely that developmental experiences play a sizeable role. Lentz and Laband (1990) found striking evidence that a parental entrepreneur's transfer of entrepreneurial human capital is a better predictor of entrepreneurial activity by children than more nepotism effects.

Implications for Entrepreneurial Pedagogy

How I think this discussion might apply in the entrepreneurship classroom centers on what we are trying to achieve: We seek to grow more entrepreneurs and, more importantly, better entrepreneurs. In the language of cognitive science, we are helping novice entrepreneurs to become expert entrepreneurs. Observers such as former *Inc.* editor George Gendron[1] have argued that entrepreneurship has grown increasingly professionalized and, in turn, that entrepreneurs increasingly seek assistance to help them grow as professionals. Whether or not one considers entrepreneurship to be a profession, we now know that there are expert entrepreneurs. As we improve our understanding of what differentiates the expert entrepreneur, we also need to focus our pedagogy in directions that helps students and trainees to grow in that direction.

Two striking examples of this have already been chronicled in this journal. First, opportunity identification often reflects relatively sophisticated skills at counterfactual thinking (Gaglio, 2004). Based on this, Gaglio trains her students in advanced counterfactual thinking techniques to increase their abilities to identify opportunities (Saks & Gaglio, 2004). Second, the entrepreneurship program at the University of Victoria focuses most of their activities explicitly on moving students from a novice entrepreneurial script toward an expert script; the expert script serves as a guide to accelerate student progress (e.g., Morse & Mitchell, 2005). Baron's (2006) argument that expert entrepreneurs are better at "connecting the dots" suggests we find ways to train students in related skills; and deliberate practice seems to be one such method (e.g., see Baron & Henry, 2006; Mitchell, 2005).

However, as educators we are hostage to what *we* know about deep cognitive structures (and other facets of how experts differ from novices). As research continues to expand in studying entrepreneurial cognition, we will expand and enrich our pedagogical toolbox. Another caveat is that it is very likely that there are more than one set of cognitive structures that reflect the expert mind-set, and it is also likely that there are more than one configuration of developmental experiences to get there. Given that human cognition often reflects dual cognitive processes, both rational and intuitive (Epstein, 1994; Sadler-Smith, 2004). For example, in terms of cognitive style, a highly intuitive entrepreneur tends to formulate entrepreneurial intentions quite differently than an entrepreneur who is highly

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1. http://www.pioneerentrepreneurs.net/bigidea_gendron.php

rational/analytic (Krueger & Kickul, 2006). We also see how complex structures are reflected in lexicographic preferences (Krueger et al., 2006). The McCall et al. (1988) study of top leaders found a remarkably parsimonious list of experiences (and lessons learned from them) that was common to almost its entire large sample. (This is not to say that results were thoroughly homogenous; idiosyncratic developmental experiences were also found, but the commonalities were impressive.) Nonetheless, as educators we must be aware that different types of entrepreneurs may have different developmental trajectories (e.g., push versus pull motivation, growth entrepreneurs versus lifestyle).

Despite the great progress already made in understanding how expert entrepreneurs think, we have much yet to learn. However, we do have exemplars from which to learn. In my experience (anecdotally) expert entrepreneurs appear to be disproportionately represented among entrepreneurship educators. If the goal is to assist entrepreneurs toward being experts, this essay would suggest that having experts as educators is more than justifiable, it may even be essential (much as we see in medical and legal training).

Also, consider the range of best practices that the field of entrepreneurship has developed. While beyond the scope of this essay, it would be relatively easy to examine, for example, award winning pedagogies and see the inherently constructivistic principles at work. Many awardees place novice learners in learning situations where they do not answer questions, they must first identify the proper questions. Rather than fulfill a relatively well-structured task such as "write a business plan for your client"—the students must first assess what tasks would solve the client's seeming problem (and may need to assess whether the apparent problem is a root cause or merely a symptom). Problem-based learning is much more than "learn by doing," as powerful as that may be. Students are forced to structure the problem and the knowledge and skills required (again as we see prevalent in medical and legal training).

Consider too, the very nature of problem-based learning. We know that problem-based learning enhances students' entrepreneurial thinking to a remarkable degree, even showing evidence of changing knowledge structures in a few months (e.g., Krueger, 2001; Souitaris, 2005). However, the particular value of problem-based learning (PBL) in entrepreneurship pedagogy is that PBL requires learners to move from answer-finding to question-creating, to take personal (cognitive) ownership of their projects. Faced with very high uncertainty, extreme time pressures and competing demands on their time and effort, problem-based learning mirrors what an entrepreneur faces on a daily basis. As students proceed, their reflections invariably lead them to that realization: the necessity for further improving their personal role identity as an entrepreneur ("It would be difficult for me to sustain any mental prototype of 'entrepreneur' that does not include 'me.' ").

If we are therefore to assist novice entrepreneurial thinkers to become experts, we need to focus some of the increasing research interest in entrepreneurial cognition to address central questions of how expert entrepreneurs differ, not just in terms of surface knowledge and skills, but in how deep structures affect how they think.

Implications for Research and Future Directions

Too often, scholars take beliefs for granted or consider them to be too far removed from human action to be sufficiently relevant. It may seem to be much simpler to use the powerful models we already have that operate at quite accessible levels. For example, we can still learn much from deploying intentions models or measures such as entrepreneurial self-efficacy. However, if we have learned anything in the last decade of entrepreneurship scholarship, it is that we need to explore the less-accessible realms of cognition; in

Simon's terms to move from the "semantic" level to at least the "symbolic" level (Sarasvathy, 2004).

How then might we begin? One potentially powerful approach is to identify expert entrepreneurs and to capture their developmental experiences: What is it that makes them differ and, even more important, how did they develop? We need also explore and test our training practices for their impact on deep structures and entrepreneurial expertise. It seems obvious that to optimally help an entrepreneur move from novice to expert, it is vital to have a strong understanding of what that expert mind-set comprises. As suggested above, the field of entrepreneurship is blessed by an unusual number of teachers who are themselves expert entrepreneurs. We need to assess the impact on student learning of having such a mind-set.

In 2002, the inaugural Victoria conference on entrepreneurial cognition and the subsequent special issues of *Entrepreneurship Theory and Practice* issues served notice that the individual entrepreneur is back in entrepreneurship: Somebody has to see an opportunity; somebody has to decide to pursue it. The 2005 Ivey conference and this special journal issue cements the reality that entrepreneurial thinking is the critical element driving entrepreneurial action. Both offer a tantalizing taste of many of the theories, constructs, and methods that cognitive science has to offer entrepreneurial scholars and educators. The field seems poised on the brink of a breakthrough as more and more scholars find tools from cognitive science to be invaluable in answering important questions about entrepreneurship and entrepreneurs (Baron, 1998; Krueger, 2003a; Krueger, Kickul, Gundry, & Verma, 2006). However, I believe that as a field we need to study entrepreneurial cognitive change at deeper levels; because I clearly anticipate that the payoffs will be most rewarding. I argue here that a research focus on deeply held beliefs and their origins will not only inform us about entrepreneurial phenomena, it will provide us with mechanisms to enhance entrepreneurial thinking in our students and trainees.

Thus far, we have only scratched the surface of understanding the critical developmental experiences of the expert entrepreneur. We need to broaden and deepen the range of potential developmental experiences (and the lessons learned from those experiences) that we can test by assessing changes in deep beliefs and deep belief structures. "Deliberate practice" may play a key role in growing the expert mind-set, but we need to specify what entrepreneurs should be practicing deliberately. What developmental experiences are critical? What "lessons" are essential?

We also need multilevel analyses that link deep cognitive structures to more surface phenomena such as intent and its antecedents (like self-efficacy). We may even follow the lead of the social neuroscientists and link cognitive changes to phenomena that are more physiological (see, e.g., Cacioppo & Berntson, 2001).

However, let us not lose sight that cognitive science offers us much in terms of well-developed theory and methods (Baron, 1998; Krueger, 2003a). Within the field of entrepreneurship, entrepreneurial cognition scholars have multiple opportunities to bring the field strong theory and strong measures. This is more than the usual call for research driven by good theory; given the rich array of tools that cognitive science offers, there is *no* excuse for *ad hoc* research studies.

In our field, we understandably have focused on what makes for successful entrepreneurship; and we have looked toward expert entrepreneurs to provide that input. However, there is likely great value in a better understanding of what nonexperts think and how they structure knowledge. In any event, process is important, and studying novice entrepreneurs (and novices at entrepreneurial thinking) will help deepen our understanding. For example, exploring how role identity changes as students move from novice to expert should be as illuminating as in other fields (e.g., Hamilton & Hitz, 1996).

To paraphrase an old economist joke, our pedagogical best practices not only work in practice . . . they also work in theory. We need to build on that. A growing research stream might examine the impacts of our teaching methods (e.g., problem-based learning) upon entrepreneurial thinking and behavior, finding that our methods make important differences on our students' thinking. However, we can do so much more—whether drilling deeper and deeper into cognitive structures (e.g., role identity) or developing more fine-grained tests of how specific teaching activities affect specific beliefs (e.g., does training in divergent thinking result in better opportunity identification?).[2]

Most importantly, as scholars discover ways to deploy an ever-increasing number of theories and methods from cognitive science, we need to ensure that we do not lose sight of this important reality. We need to explore how deep cognitive change occurs and how we might replicate such change.

Conclusion

I do not know what I may appear to the world; but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.

Sir Isaac Newton

Like Newton, I hope I have offered the reader a few shiny pebbles; and while I hold some of those pebbles quite dear, it is very clear to me that cognitive science offers an ocean of great ideas, theories, and methods that entrepreneurship scholars and educators can explore profitably for many years. There are smoother pebbles and prettier shells yet to be found.

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2. We have even been encouraged by the Association of American Collegiate Schools of Business (AACSB) to quantify our impact as a means of growing the legitimacy of entrepreneurship as an academic field (John Fernandes, CEO of AACSB; U.S. Association for Small Business & Entrepreneurship conference keynote, Tucson, January, 2006.)

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