

The Cognitive Perspective in Entrepreneurship: An Agenda for Future Research

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ABSTRACT Despite its many achievements, scholarship at the intersection of entrepreneurship and cognition has focused primarily on the consequences of what happens when an entrepreneur benefits from various cognitive characteristics, resources, or other dispositions. As such, cognitive research in entrepreneurship continues to suffer from narrow theoretical articulations and weak conceptual foundations that lessen its contribution to the managerial sciences. To address these issues, we draw from extant work on the nature and practice of cognitive research to develop a systematic approach to study entrepreneurship cognition. To further articulate this agenda, we assess the state of the field by content-analysing entrepreneurship cognition articles published between 1976 and 2008. We find that, although it has investigated many relevant variables, research on entrepreneurship cognition has failed to fully articulate key conceptual features of the cognitive perspective. Building on these observations, we propose concrete strategies and research questions to augment the contribution of entrepreneurship cognition research, and advance this research beyond its current focus on ‘cognitive consequences’. In particular, we illustrate the scholarly potential of disentangling the various antecedents of entrepreneurship cognition, of studying the process interactions between cognitive resources and mental representations, and of exploring the operation of entrepreneurship cognition across levels of analysis.

INTRODUCTION

Research on entrepreneurship cognition has drawn increased attention since Comegys’ (1976) article on the role of entrepreneurs’ cognitive styles (cf. Forbes, 1999; Hisrich et al., 2007; Katz and Shepherd, 2003). This prominence is often associated with a renewed interest in the individual’s role within the entrepreneurial process (cf. Baron, 2004; Krueger, 2003; Mitchell et al., 2002). Yet, scholars have also leveraged the

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cognitive perspective to cast light on a broad range of entrepreneurship phenomena articulated at several levels of analysis – from studying the consequences of entrepreneurs' thoughts, interpretations, and reasoning abilities (e.g. Busenitz and Barney, 1997; Gatewood et al., 1995; Haynie et al., 2009) to documenting the multi-level dynamics that lead to the emergence of opportunities and new ventures in a particular field or region (e.g. Sarasvathy and Dew, 2005) or the development and use of a firm's fundamental sources of competitive advantage (e.g. Alvarez and Busenitz, 2001; Bingham et al., 2007).

Although it has become a significant area of study, cognitive research in entrepreneurship continues to suffer from important conceptual challenges that lessen its effective contribution to the managerial sciences. For instance, many works are built on the premise that founders and entrepreneurs 'think' differently than other individuals or business executives (e.g. Busenitz and Barney, 1997). But it is far less clear whether this 'cognitive difference' originates from idiosyncratic factors and events that *predate* entrepreneurs' efforts and actions, or from the very experience of entrepreneurship by these individuals (cf. Foo et al., 2009; Sarasvathy, 2008). Similarly, it is not clear whether the 'cognitive difference' of entrepreneurs results from tasks and environmental conditions that 'reward' individuals with particular 'thinking', or from conditions that encourage the expression and/or development of such thinking (cf. Baron, 1998, 2000; Lovallo et al., 2008).

As a result, critics have questioned the extent to which cognition offers something truly unique and relevant for entrepreneurship research, over and above what is offered by other perspectives. For instance, some have suggested that cognitive research rests on assumptions and methods that are ill-equipped to capture the complex, multi-level dynamics of entrepreneurship (cf. Breslin, 2008 vs. Gartner, 2007). Others have noted that, in real-life situations, the effects of cognitive phenomena could often be dominated by organizational or socio-economic dynamics (e.g. McNamara and Bromiley, 1997).

To help address these concerns and augment the contribution of entrepreneurship cognition research, we develop a conceptual agenda for the systematic study of entrepreneurship cognition. We develop this agenda in three logical steps. First, we build on extant work about the nature and development of the cognitive perspective in the social sciences to highlight the implications of three fundamental features that characterize cognitive research: (1) a focus on the cognitive elements underpinning human action; (2) the articulation of a process orientation; and (3) the operation of cognition across levels of analysis. By doing so, we explicitly anchor our research agenda in the conceptual foundations of cognitive science. Second, and to better identify avenues for future research, we assess the manner and extent with which entrepreneurship cognition research leverages the three features noted above. By content-analysing 154 entrepreneurship cognition articles published between 1976 and 2008, we show that for all its achievements, extant research on entrepreneurship cognition has yet to leverage the full potential of the cognitive perspective. Third, we build on these observations to formalize our research agenda. More specifically, we propose a series of research questions and strategies that illustrate how one can address current challenges facing entrepreneurship cognition research, and thereby augment the contribution of cognition research to entrepreneurship and the management sciences.

THE CONCEPTUAL FOUNDATIONS OF COGNITIVE RESEARCH IN ENTREPRENEURSHIP

In spite of prior reviews, definitional papers, and special issues, systematic discussions of the meaning and implications of doing cognitive research in entrepreneurship have been few and far between (cf. Baron and Ward, 2004; Shaver and Scott, 1991). As a result, the conceptual foundations of entrepreneurship cognition research have remained largely implicit. In turn, this has led to confusion and misunderstandings that have made it difficult to address directly the conceptual challenges that entrepreneurship cognition research confronts. To better identify avenues for addressing these challenges, we first discuss the conceptual articulation of the cognitive perspective for entrepreneurship.

Drawing from extant literature on the foundations of cognitive research in the social sciences in general (cf. Bishop, 2005; Gardner, 1985; Gibbs, 2006), and in social psychology (cf. Fiske and Taylor, 1991; Smith, 2000) and the management sciences in particular (cf. Hodgkinson and Healey, 2008; Huff, 1997; Lant and Shapira, 2001; Walsh, 1995), we identified three key features that, taken together, systematically characterize cognition research:

- (1) Mentalism, i.e. a focus on studying the mental representations of the self, of others, of events and contexts, and of other mental states and constructs.
- (2) A process orientation, i.e. a concern for studying the development, transformation, and use of these mental representations and constructs.
- (3) The operation of cognitive dynamics across different levels of analysis.

We acknowledge that adopting a cognitive perspective in particular disciplines may imply other features, and note that the emphasis on particular aspects may vary between different areas. In the broad field of cognitive science, for instance, there remains lively debates about the nature of cognition as a computational phenomenon that is primarily articulated 'within the mind', or as an embodied/situated phenomenon that emerges from interactions between the brain, body, and world (cf. Gibbs, 2006 vs. Rupert, 2009). In applied fields like managerial sciences, parallel debates have concerned the tensions between the rational ideals of economic theories and the psychological and organizational phenomena that affect the pursuits of such ideals (cf. Lant and Shapira, 2001; Lovallo et al., 2008). Yet over and above their differences, these theoretical positions share common ground in the idea that understanding human behaviour requires consideration of mental representations and processes across level of analysis.

Accordingly, the purpose of our review is not to advance a particular position, but to build on the central features of cognitive science to develop an agenda for cognition research in entrepreneurship. We briefly review each feature below and then draw their implications for entrepreneurship research.

Mentalism

A first key feature, *mentalism* (Fiske and Taylor, 1991, p. 14) reflects the cognitive perspective's assumption that, to understand human activity, it is important to consider

the mental representations of the self, of others, and of events and contexts – the so-called *cognitive elements* of human action (see also Gardner, 1985, pp. 6, 38–40). This emphasis on mental representations is notably expressed through the study of attributions, cognitive maps, knowledge structures, perceptions, scripts, and schema. Yet this focus on the cognitive elements of human action implies more than the adoption of a subjectivist epistemology.

First, cognitive science's mentalism is not limited to drawing attention to the subjective interpretations and perceptions that individuals make of their immediate environment: it also calls for attending to mental constructs and phenomena that proceed from human nature and the sum of one's idiosyncratic experiences, from knowledge and expertise to cognitive abilities and routines, intelligence, expertise, or one's desires and motivations (cf. Morsella et al., 2008). In other words, the articulation of cognitive science's mentalism draws attention to two different sets of cognitive factors and dynamics that can influence human action: those that proceed from the perception and interpretation of the circumstances when and where action is to take place, and those that proceed from the cognitive 'resources' that people bring to these circumstances, from their genetics to their knowledge and desires.

Second, the cognitive perspective assumes that, just like knowledge and mental representations, concepts such as attitudes, motivations, and other mental states can be treated as 'hypothetical mental constructs' postulated to exist 'in the mind' – even if one can only observe them through their indirect effects (cf. Sternberg and Ben-Zeev, 2001; Thagard, 2005). This feature distinguishes cognitive science from behaviourism and related perspectives, which assume that mental states are nothing more than 'intervening variables' that cannot be observed independently (cf. Fiske and Taylor, 1991; Smith, 2000). For social psychologists studying attitudes, for instance, this implies that, instead of treating attitudes as abstract summaries of individuals' tendencies to view particular objects as positive or negative, one can treat attitudes as mental constructs that are subject to the same dynamics that affect other mental structures (such as representations held in memory or constructed from perception). Consequently, it becomes possible (and relevant) to investigate the development and storage of attitudes in the mind, as well as the manner with which cognitive dynamics affect the transformation of attitudes and their influence on judgment and behaviour (cf. Cialdini et al., 1981; Fiske and Taylor, 1991). This forms the basis for cognitive science's second fundamental feature: its process orientation.

The Articulation of a Process Orientation

From a broad conceptual standpoint, the articulation of cognitive science's process orientation can be found in a particular concern for studying the dynamic interactions between environment, cognition, and action. In comparison to behaviourism (which conceives behaviour as emerging from patterns of stimulus–response–reinforcement and is thus focused on the *outcome* of such patterns), the cognitive perspective stresses that behaviour proceeds from complex interactions between the environment and the mind (cf. Bruner, 1990; Fiske and Taylor, 1991; Turner, 2001). As a result, cognitive research

places a noted emphasis on how, when, and why these interactions between mind and environment play a role in the development, transformation, and use of mental representations and other cognitive constructs, and on how, when, and why these elements come to influence (and be influenced by) human action.

This process orientation is perhaps most commonly associated with the information-processing model (cf. Broadbent, 1958; Neisser, 1967; Newell and Simon, 1956) and the so-called 'computational perspective' on human behaviour (cf. Anderson, 1983; Lant and Shapira, 2001). According to this model, human behaviour is influenced by information input (whether from the environment or from memory), but also by the mediating role of innate propensities and abilities of the mind (e.g. perceptual filters, intelligence, etc.). In practice, this led scholars to investigate the rules and routines that guide reasoning and other mental processes (from perception, interpretation, and memory to decision-making, creativity, and learning). At the same time, this emphasis on computational rules and routines drew attention to the many factors and dynamics that may constrain human cognition, whether at the level of individual(s), group(s), organization(s), or society(ies) (cf. Kahneman and Tversky, 1996; March and Simon, 1958).

Although it has been an important axis of development for cognitive science, this emphasis on mental rules and routines drew criticism from scholars who argue that very little conscious control can be exerted on core mental processes; as a result, the cognitive perspective may ultimately be no less deterministic than the behaviourism it sought to replace (cf. Bishop, 2005; Bruner, 1990; Taylor, 1985). In parallel, several studies sought to explore the heuristics, means, and strategies that could be leveraged to address the constraints placed on cognition, but also whether these strategies were necessarily less effective than the ideal solution of rational/computational models (cf. Gigerenzer, 1996, 2006; Sarasvathy, 2001). By doing so, these studies show that the computational model's emphasis on rules and constraints is not the only way to articulate a process orientation in cognition research.

For instance, the sensemaking approach developed by Weick and others (cf. Klein et al., 2006; Weick, 1995; Weick et al., 2005) has emphasized the upstream/downstream processes by which individuals and groups extract patterns of meaning from ambiguous environments, as well as how these processes participate in the very construction of the social reality where individuals and groups operate (cf. Anderson and Nichols, 2007; Oliver and Montgomery, 2008; Rouleau, 2005). For their part, Sarasvathy (2001, 2008) has drawn attention to the effectual strategies by which individual entrepreneurs address the radical uncertainty plaguing their endeavours, and how these efforts subsequently influence the emergence and renewal of economic artefacts (e.g. new supply-demand transactions, markets, organizations). Others have developed the idea that cognition is fundamentally *situated* in a physical body and/or context (cf. Gibbs, 2006; Kirshner and Whitson, 1997; Lakoff and Johnson, 1999). In practice, this position has led some scholars to de-emphasize the role of memory processes and the retrieval/processing of knowledge and information to emphasize instead the complex interactions between agent and context, as these are done *in situ* (cf. Elsbach et al., 2005; Huda and Al-Maskati, 1997; Lant, 1999).

The Articulation of Cognition Across Levels of Analysis

A third feature of cognitive science concerns the operation of cognition at different levels of analysis – and the implications this has for understanding human action. Whereas the cognitive perspective focuses explicitly on mental representations and other constructs operating in the mind, the articulation of such constructs need not be restricted to the individual level of analysis. For instance, research in organizational cognition has been conducted on the mental representations of individual managers (cf. Cossette and Audet, 1992; Stubbart, 1989), just as others have focused on the mental representations held by groups of managers within particular firms, within strategic groups of firms, or across industries (cf. Porac et al., 1989; Reger and Huff, 1993). This articulation at different levels of analysis reflects an important assumption of the cognitive perspective: the assumption that cognition operates across multiple levels of analysis that span the range of human activity, from individual to group, organization, and society (cf. Hodgkinson and Healey, 2008; Huff et al., 2000; Walsh, 1995). Just like mental representations, ideas, and other mental resources can be ‘shared’ with others, the dynamic relationships between environment, mind, and action can also take place across levels of analysis. As a result, different research can ascribe a particular cognitive construct or phenomenon to different levels of analysis. More importantly, it becomes possible (and relevant) to investigate how cognitive phenomena anchored at different levels may influence one another.

Implications for Entrepreneurship Cognition Research

Taken together, the three features reviewed above provide a theoretical basis to address the challenges that entrepreneurship cognition research currently faces.

First, the articulation of cognitive science’s mentalism encourages us to distinguish more clearly the cognitive factors and phenomena that *predate* entrepreneurial action from those that are more germane, immediate, and idiosyncratic to a particular action in a particular context. In turn, this calls us to study the respective roles that representations, interpretations, perceptions, emotions, and other motivations regarding one’s immediate circumstances play in entrepreneurship, relative to that of cognitive resources, skills, abilities, and other predispositions that proceed from one’s lifetime of learning and experiences. In other words, the articulation of cognitive science’s conceptual foundations allows us to disentangle the various sources of entrepreneurs’ ‘cognitive difference(s)’.

Second, the articulation of cognitive science’s process orientation encourages us not only to consider the effects of cognitive variables for entrepreneurial action, but also to articulate the relationships between mind, environment, and entrepreneurial action that influence the development, use, and transformation of these variables. In this regard, cognitive science’s process orientation calls us to investigate the unfolding of entrepreneurial thinking and to understand the cognitive reasons *why* some cognitive variables and phenomena come to play the role they do in entrepreneurship. For instance, this process orientation implies that we understand how, when, and why the cognitive resources that support entrepreneurship interact with one’s representations of the task

and general environments that are directly relevant to entrepreneurial action. It also draws our attention to the effects of entrepreneurial action on those cognitive representations and resources.

Third, the articulation of cognition across levels of analysis encourages us to investigate the mutual influence between the mental representations and cognitive resources of entrepreneurs, and those of their team, of the organization they help launch and grow, and of the larger society where their entrepreneurial action takes place. In turn, this allows us to unpack the cognitive dynamics that underpin entrepreneurial action not only across time but also across levels of human activity.

To address the lingering ambiguity regarding the ‘cognitive difference(s)’ of entrepreneurs and the conceptual challenges that hinder cognitive research on entrepreneurship, it would thus appear beneficial to articulate research on the implications that the above three features of cognitive science have for entrepreneurship. Before we develop concrete strategies and research questions to do this, however, it becomes important to assess the state of entrepreneurship cognition research with respect to these key features.

RESEARCH METHODOLOGY

To identify avenues for addressing the conceptual challenges faced by cognitive research in entrepreneurship, we content-analyse a representative sample of 154 relevant articles published between 1976 and 2008. Unlike prior reviews, we do not trace the history of cognitive research in entrepreneurship (cf. Katz and Shepherd, 2003), nor do we define the importance of cognitive research for various stages or aspects of the entrepreneurial process (cf. Forbes, 1999; Krueger, 2003; Shook et al., 2003). Rather, we assess the manner and extent with which cognitive research in entrepreneurship articulates the three conceptual features of the cognitive perspective reviewed above. The following describes the methods we followed to identify and analyse these works.

Sampling Procedures

We used criterion sampling (Patton, 1990) to identify a valid sample of entrepreneurship cognition articles. Specifically, we conducted a series of keyword searches in three reference databases: (1) EBSCO’s Business Source Complete[®]; (2) ProQuest’s ABI/INFORM – Complete (Business)[®]; and (3) EBSCO’s PsycInfo[®]. We used the Business Source Complete and ABI/INFORM databases because they focus explicitly on articles pertaining to the large domain of business studies. We included the PsycInfo database as a reliability strategy to ensure that we captured relevant articles published in psychology journals that may not be catalogued by the other two databases. For all three databases, we searched for articles that met the relevant search keywords and criteria listed in Table I.

From a methodological standpoint, the use of criterion sampling with the search power of these databases has three main advantages. First, it provides a fast and efficient manner to scan millions of articles in thousands of journals. Second, conducting our searches with well-known and widely available databases that include a broad array of journals increases the external validity of our sample – relative to the alternative of

Table I. Sampling criteria

<i>Criteria</i>	<i>Rationales</i>
(1) Publication between 1976 and 2008 (inclusively)	We chose the starting point of 1976 because it corresponds to the publication date of the earliest entrepreneurship article we could identify that specifically used the term 'cognition' (cf. Comegys 1976).
(2) Use of the following combination of keywords (and related derivatives) in the article's title, abstract and/or keywords: EITHER Entrepreneur(s), entrepreneurship, entrepreneurial, entrepreneurship (entrepreneur*); New/emergent/ing (emerg*) business(es); New/emergent/ing (emerg*) venture(s)/venturing (venture*); Small business(es); Founder(s). AND Cognition(s), cognitive, etc. (cognit*)	Consistent with a criterion sample approach, we focus on the use of specific keywords for both entrepreneurship and cognition. This is done to ensure that the identification of possibly relevant work rests not on our own interpretative biases, but rather on the authors' own words – i.e. how they chose to portray their research. We base our choice of entrepreneurship keywords on two sources that specify relevant keywords: (a) the Domain Statement of the Academy of Management's Entrepreneurship Division (http://division.aomonline.org/ent/EntprDivGenInfo.htm); and (b) the specific keywords used by Busenitz et al. (2003) and Forbes (1999) in their reviews of entrepreneurship and entrepreneurship cognition articles, respectively. In the same fashion, and again to increase the rigour and validity of our sampling, we relied on derivatives of the root 'cognit' to focus specifically on articles whose authors aimed to make a contribution that they explicitly conceived as 'cognitive', or as involving concepts relevant to 'cognition science'. We focus on this single term because it is explicitly specific to the conceptual focus of our review. There are no conceptually adequate synonyms. For instance, using associated topics (e.g. thinking, reasoning) would have generated list of articles that might not build explicitly on the assumptions and theories of cognitive science. Conversely, our single focus on 'cognit' still allows us to capture articles that draw from a variety of cognitive approaches, whether computational, embodied, or situated.
(3) Publication in a peer-reviewed academic journal (as per database records)	Because reference databases include a broad range of publications, we use the criteria of peer-reviewed journals as a means to narrow our search results to journals that publish academic research (as opposed to news-, trade-, practice- or consulting-oriented pieces).
(4) Publication in a journal that is indexed in Thomson Reuters' Social-Science Citation Index®	We use this criterion to narrow our search results to articles published in journals that can claim to have had a sufficient impact on academic research to warrant their indexing in the SSCI. Although we acknowledge that a journal's indexing is an imperfect measure of the quality of its content, this criterion allows us to focus our sampling on articles that aspire to make the significant contribution(s) to the domain, thereby increasing the rigour and validity of our sampling.
(5) Publication as a full-length journal article or research note	Following Busenitz et al. (2003, p. 290), we excluded research summaries that were less than five pages in length, book reviews, editorial pieces, as well as replies to previously published articles. However, please note that we kept in the sample the introduction to four special issues focused specifically on entrepreneurship cognition, and published in <i>Entrepreneurship Theory and Practice</i> (2002; 2004; 2007) and the <i>Journal of Business Venturing</i> (2004), on the rationale that each attempted to make specific contributions to the domain of entrepreneurship cognition, over and above the simpler motivation and summarizing of the special issue.

manually sifting through a narrower and arbitrary list of target journals. Third, and perhaps most importantly, the use of criterion sampling allowed us to build our sample on the words and language with which authors chose to describe their work – as opposed to relying on the indexing of these works by a subjective third-party. To the extent that the authors of relevant articles aim to make a contribution at the interface of entrepreneurship and cognitive sciences, they are likely to use a combination of entrepreneurship- and cognition-related keywords. Focusing on the authors' own words thus limits selection biases on our part, and augments the content validity of our sample.

Because the results of keywords search can include a broad variety of documents that may be of varying relevance, we followed a series of steps to filter the results and identify a final sample that is characterized by a high degree of content validity and is representative of the best research conducted at the interface between entrepreneurship and cognition. We present the details of these procedures in Appendix 1. The final sample we obtained counts 154 entrepreneurship cognition articles.

Data Analysis and Coding Schemes

To assess the manner and extent to which the body of entrepreneurship cognition research effectively leverages the three conceptual features of the cognitive perspective discussed above, we developed an analytical framework based upon prior research (cf. Walsh, 1995) and used it to content-analyse the 154 articles in our sample. The use of content-analysis techniques is particularly appropriate for this purpose because the data of interest is embedded within the text, tables, and figures written by the authors of the articles we analysed (cf. Krippendorff, 2004; Neuendorf, 2002).

- (1) To assess the kind and range of cognitive elements of human action investigated in entrepreneurship cognition research, we inventoried the list of relevant cognitive variables and constructs studied across the articles in our sample. In addition to noting whether these variables are used as independent predictors or dependent outcomes, we discuss whether these variables concern aspects of mental representations or cognitive resources for entrepreneurship.
- (2) To assess the articulation of the cognitive perspective's process orientation in entrepreneurship cognition research, we content-analysed the 154 articles in our sample to determine their focus on one or more of Walsh's (1995) phenomena of cognitive relevance, namely: (1) the *representation* and *attributes* of cognitive constructs (e.g. their nature, content, characteristics, and organization); (2) the *origins* and *antecedents* of cognitive constructs; and (3) the *use* and *consequences* of these constructs. In this regard, we postulate that research that simultaneously considers two or more phenomena of cognitive relevance has more implications for cognitive science's process orientation than research that addresses only one of Walsh's (1995) categories.
- (3) To assess the articulation of cognition across levels of analysis, we content-analysed each article to determine the level at which their cognitive variables and phenomena were operationalized.

Table II. Coding scheme

<i>Coding categories</i>	<i>Operationalization</i>
<i>Variables of cognitive interest</i>	
Independent/explanatory	When a particular variable of cognitive interest is used as an 'input' factor in a relationship that is modelled, or as a predictor, regressor, controlled, manipulated, explanatory, or exposure variable (Dodge, 2003)
Dependent/explained	When a particular variable of cognitive interest is used as an 'output' factor in a relationship that is modelled, or as response, regressed, observed, responding, explained, or outcome variable (Dodge, 2003)
<i>Cognitive phenomena of interest</i>	
Representation	The article focuses on identifying/revealing the attributes, properties, and/or characteristics of a cognitive variable of interest – its 'content' so to speak. This includes research on knowledge structures like categories, mental/causal systems, mental models, scripts or other schemas, but also studies aimed at defining or validating the content/structure of cognitive constructs and other mental states. This specifically excludes research focusing on the antecedents (causes), use, and/or consequences(effects) of such attributes
Antecedents	The article focuses on the development/formation of a cognitive variable of interest, its antecedents, and/or causes so to speak
Consequences	The article focuses on the use/implications of a cognitive variable of interest, its consequences, and/or effects so to speak
Other	The article cannot be categorized in terms of the above categories
<i>Level of analysis (for relevant variable(s) of cognitive interest)</i>	
	The article's relevant variable(s) of cognitive interest is (are) articulated, operationalized, and/or measured at the level of:
Individual(s)	Individuals (or categories thereof)
Team(s)	Teams/groups (or categories thereof)
Firm(s)	Firms (or categories thereof)
Industry(ies)	Industries (or categories thereof)
General context(s)	General context, environment (or categories thereof)
Nation(s)/society(ies)	Countries, societies, cultures, or nations (or categories thereof)
Information stimulus(i)	Information context (as in particular information stimuli)
Other	The article cannot be categorized in terms of the above categories

We present the articulation of our coding schemes in Table II. Details about the rationales and procedures we followed for coding each article can be found in Appendix 2.

SUMMARY OF EMPIRICAL RESULTS

The Cognitive Elements of Entrepreneurial Action

The 154 articles in our sample investigated a total of 96 different independent/explanatory variables of cognitive interest, and 53 different dependent/explained variables of cognitive interest. Naturally, groups of articles that shared a particular disciplinary anchor (such as psychology, sociology, economics, or managerial or organizational cognition) tended to emphasize distinct sets of variables.

For instance, the five articles on information economics focus on the effects of knowledge. Although this focus finds its expression in different concepts (e.g. prior knowledge of individuals vs. similarity of firms' knowledge environments), these papers articulate knowledge as a cognitive resource for entrepreneurship. The ten articles drawing from sociology and institutional theory show a similarly high degree of focus. Indeed, all the papers in this group study issues of cognitive legitimacy or the cognitive institutions for entrepreneurship. Likewise, eight of the 11 articles anchored on network sociology focus on cognitive dimensions of social capital. In both cases, the variables of cognitive interest are articulated as resources that support or foster entrepreneurship activities.

By comparison, other groups of articles display a broader range of variables – and different articulations. For instance, the eight articles drawing from subjective economics have emphasized nine different variables that tend to emphasize aspects of mental representations (e.g. perceptions of uncertainty, incongruence and incompleteness of mental representations, cognitive frames). These variables are generally used as independent predictors of entrepreneurship outcomes. The 17 articles anchored in management and organization cognition also exhibit a broad range of variables. Of the 23 cognitive variables studied, 13 are used as independent predictors. Interestingly, the independent variables tend to be about cognitive resources for entrepreneurship (e.g. mode of decision-making, mindful alertness, emotional energy, ambiguity absorption, information processing capabilities), while the dependent variables tend to be about mental representations (e.g. perceptions, motivations towards entrepreneurship, content and structure of cognitive maps). The four articles based on communication studies highlight eight different variables of cognitive interest (four as predictors), and all eight have to do with aspects of mental representations that are relevant for entrepreneurship (e.g. public discourse about entrepreneurship, beliefs of feasibility/desirability, metaphors about entrepreneurship).

The 98 articles drawing from psychology investigate 51 independent and 24 dependent variables of cognitive interest. Among the articles that emphasize cognitive resources, 18 discuss various dimensions of personality; 15 discuss decision biases and heuristics; 12 study cognitive styles; ten look at self-efficacy; and seven focus on experience as a cognitive resource. Most articles in this group study these variables as cognitive resources predicting entrepreneurship-relevant outcomes. Along this line, ten papers discuss intentions towards entrepreneurship and growth (nine as an outcome variable). Yet a number of articles also discuss cognitive representations relevant to entrepreneurship: 13 discuss the role of perceptions (11 as predictors of entrepreneurship outcomes); nine focus on mental schema, models, frameworks and the related concepts of cognitive scripts, maps, and beliefs (generally as predictors); and six others focus on broader motivations towards entrepreneurship (four as predictors).

Taken together, these observations map the broad terrain covered by entrepreneurship cognition research over the last 33 years. From the perspective of cognitive science's first feature (the focus on the cognitive elements of human action), cognitive research in entrepreneurship has studied many relevant elements. Several of these relate to factors that predispose individuals, groups, firms, and/or societies to exhibit higher levels of relevant entrepreneurship dimensions, or as factors that characterize such individuals, groups, firms, or societies. Yet, a number of studies investigate the

mental representations, scripts, and other schemas, perceptions, and interpretations that are associated with entrepreneurial action.

Even when accounting for the different operationalizations of closely-related variables, however, results indicate that most variables are studied in only a few articles. This suggests that the recent and rapid development of entrepreneurship cognition research may not (yet) have led to the articulation of convergent research programmes focusing on common conceptual models and variables. In parallel, we also observe that most variables of cognitive interest are studied as independent predictors of relevant outcomes. By contrast, only 19 variables are studied as both independent and dependent variables (across different studies). This suggests that more research has been done on the effects of cognitive variables than on their origins – an observation that is relevant for our next point of analysis.

The Articulation of a Process Orientation

Results from our content analyses indicate that across all groups of articles anchored on different disciplines, the predominant articulation of entrepreneurship cognition research is to emphasize the consequence(s) of cognitive variables. This articulation accounts for some 76 articles in our sample (49.4 per cent). By comparison, 18 articles (11.7 per cent) focus on the representation of cognitive variables, and 21 (13.6 per cent) on the antecedents of such variables. More importantly, our results show that few articles focus simultaneously on two or more phenomena of cognitive relevance. For 23 articles (14.9 per cent) that simultaneously consider the antecedents and consequences of cognitive variables, only five (3.25 per cent) simultaneously consider the representation and consequences of cognitive variables, while five others simultaneously consider the antecedents, representation, and consequences of cognitive variables. Furthermore, we note that only 12 of these 33 articles are empirical.

Taken together, these observations suggest that from the standpoint of cognitive science's second feature (i.e. the articulation of a process orientation), cognitive research in entrepreneurship has been somewhat limited. To further establish the validity of these findings, we conducted a series of post-hoc keyword searches at the level of individual articles. Specifically, we used the capabilities of Microsoft Word® and Adobe Acrobat® to manually search the digital files of all articles in our sample to document instances of keywords associated with conceptual approaches thought to be particularly sensitive to the articulation of a process orientation, especially with respect to interactions between mind, body, and environment (e.g. sensemaking, effectuation, or embodied/situated cognition). Results indicate that only 22 articles referred to sensemaking (14.3 per cent), ten referred to effectuation (6.5 per cent), and one referred to situated cognition (0.6 per cent). More to the point, only four articles referred to such keywords more than six times (two for sensemaking and two for effectuation). To the extent that these approaches denote a particular interest for the unfolding dynamics of cognition as a process, these observations provide converging evidence that, from a conceptual standpoint, the articulation of cognitive science's process orientation in entrepreneurship cognition research has so far been limited.

The Study of Cognition Across Levels of Analysis

Our results indicate that the articulation of cognitive research at different levels of analysis varies between disciplinary anchors. Not surprisingly, studies based upon more ‘macro’ disciplines like economics and sociology tend to draw inferences about contextual variations (22 articles do this, or 14.3 per cent), whereas studies grounded in ‘micro’ disciplines tend to draw inferences about individual variations (72 articles do this, or 46.8 per cent) or about groups (11 articles, or 7.1 per cent). Some 16 studies (10.4 per cent) also draw inferences about firm-level variations (notably articles from managerial and organizational cognition, but also some articles drawing from sociology).

Across all disciplinary anchors, however, few articles simultaneously consider variables articulated at *different* levels of analysis (e.g. individuals + firms, context). Of the 26 articles that do so (16.9 per cent), 22 simultaneously consider cognitive variables grounded at the individual levels of analysis, and cognitive variables that are articulated as properties of the general context (e.g. non-individual/broad perceptions of business climate, environment dynamism, perceptions regarding entrepreneurship, cultural values). The four other articles simultaneously consider individual variables and firm- or industry-specific variables. Interestingly, 14 of these 26 articles are empirical. Looking across the entire sample, however, these observations suggest that from the standpoint of cognitive science’s third feature (i.e. the study of cognition across levels of analysis), cognitive research in entrepreneurship has been primarily focused on studying cognition at single levels of human activity (whether the individual, the firm, or society) – as opposed to studying the operation of cognitive dynamics *across* levels of analysis.

A CONCEPTUAL AGENDA FOR COGNITIVE RESEARCH IN ENTREPRENEURSHIP

The results above show that cognitive research in entrepreneurship has investigated a rich set of cognitive elements related to entrepreneurial action. Furthermore, the increasing number of entrepreneurship cognition articles published each year, not only in entrepreneurship journals but also in broader management and social sciences journals, suggests that cognitive research in entrepreneurship is making contributions that are perceived as both significant and valuable.

For all its achievements, however, our empirical analyses indicate that cognitive research in entrepreneurship has yet to articulate fully the conceptual implications of the cognitive perspective. Three observations are notable in this regard. First, the dominant mode of research in entrepreneurship cognition has been to emphasize the consequences that cognitive variables have on relevant outcomes. Few studies investigate the origins or development of these variables. Because of this, however, ambiguity subsists about the source and nature of entrepreneurs’ ‘cognitive differences’. Second, the articulation of cognitive science’s process orientation has been relatively limited. For instance, few studies directly investigate the respective influence that cognitive resources *and* cognitive representations have, not only on entrepreneurial action, but also on each other. As a result, important questions remain about how, when, and why relevant cognitive variables have the influence they have on entrepreneurship. Third, there have been few

efforts to study the articulation of entrepreneurship cognition across levels of analysis. Because of this, there is limited understanding of the social unfolding of entrepreneurship cognition, not only between individual actors but also between individuals and groups, firms, and society.

In a sense, entrepreneurship cognition may have been a victim of its own success. Conceptual models and empirical studies that emphasize the effects of cognitive variables have been so fruitful that scholars have had few incentives to examine fully the complexity of cognition as a process (and/or across levels of analysis). Over the years, however, this success has had the unintended effect of masking the conceptual foundations that cognitive research in entrepreneurship could build upon to cast light on the so-called 'cognitive difference' of entrepreneurs (cf. Shaver and Scott, 1991). Interestingly, rectifying this situation does not require paradigmatic or philosophical convergence, nor does it demand shared methodological preferences. Instead, it calls for a scholarly shift in mindset in which scholars keep cognitive dynamics front and centre. As opposed to conceiving of cognition as a resource *one has*, it encourages scholars to think of cognition as something *one does*. By emphasizing cognition as a verb, this scholarly mindset draws attention to the unfolding dynamics between mind, environment, and action.

Together, the above observations point to a clear agenda for future research. If we are to address the challenges and criticisms levied against cognitive research in entrepreneurship, to better understand the so-called 'cognitive difference' of entrepreneurs, and to augment the contribution of this research to the managerial sciences, it becomes necessary to leverage more completely the conceptual foundations of the cognitive perspective in entrepreneurship research. To do so, we propose a systematic agenda for future research on entrepreneurship cognition. Building on the observations above, this agenda emphasizes three primary axes:

- (1) To better understand the role of cognition in entrepreneurship (and the unique particularities of entrepreneurial cognition and its various aspects), we encourage future research to pay attention not only to the consequences of relevant cognitive variables, but also to the *origins and development* of such variables. To this aim, we call for scholars to distinguish between different antecedents of entrepreneurship cognition – and to study these distinctions specifically.
- (2) To better understand how, when, and why different cognitive variables play a role in entrepreneurship, we encourage that future research fully articulate cognitive science's *process orientation*. To achieve this aim, we call for scholars to study the interactions between cognitive resources and mental representations, and to conduct studies that simultaneously consider two or more phenomena of cognitive relevance (Walsh, 1995).
- (3) To better capture the dynamic relationships between mind, environment, and entrepreneurial action, we encourage future research to consider simultaneously the role and interactions of different variables of cognitive interest articulated at different levels of analysis.

We discuss strategies for articulating this agenda in the paragraphs that follow. We begin by discussing the articulation of each axis, separately. We then discuss their

operationalization in four important areas of entrepreneurship cognition research: research anchored on psychology, economics, sociology, and research at the interface with managerial and organizational cognition.

Studying the Origins and Developments of Entrepreneurship Cognition

Given the nature of entrepreneurship as a field of applied science, the observed emphasis on the *consequences* of cognitive variables for entrepreneurship is hardly surprising. To the extent that entrepreneurship provides important socio-economic benefits, knowing the effects that particular cognitive factors and dynamics have on entrepreneurship allows for designing relevant policies, consulting practices, and/or educational strategies. Nevertheless, focusing primarily on the *consequences* of cognitive variables has important implications for entrepreneurship and management research. Because the emphasis is on the effects of independent predictors, variations on these predictors are generally taken as ‘given’: they fall outside the scope of one’s studies. At the level of the entire field of research, however, this limits our scholarly abilities to investigate the underpinnings of entrepreneurship cognition.

In their 1997 classic study, for instance, Busenitz and Barney showed that founders of small independent firms tend to rely more on decision heuristics than non-founder-managers of large established companies (Busenitz and Barney, 1997). Many have argued that this ‘decision preference’ of entrepreneurs is advantageous when dealing with highly uncertain tasks and situations (cf. Gaglio, 2004; Simon et al., 2000). But is this the reason why entrepreneurs are more likely to use decision heuristics in the first place? Is this decision preference the manifestation of enduring traits that encourage some individuals to self-select into entrepreneurial pursuits? Could it be instead the result of environmental constraints that increase reliance on heuristics or that reward using such heuristics? Or could it be the result of learning dynamics whereby some individuals develop this preference over time, as a result of their engaging in entrepreneurial efforts – irrespective of their success at it?

These questions have been discussed abundantly in the literature (cf. Baron, 1998; Forbes, 2005; Simon and Houghton, 2002). But the conundrum endures, and extends beyond entrepreneurs’ reliance on particular decision heuristics. The problem is compounded further by the fact that it straddles two different sets of causal dynamics: whether the causes of entrepreneurship cognition proceed from internal or external dynamics, but also whether these causes predate entrepreneurial action or proceed from the particular circumstances of that action. The distinction between these two sets of dynamics is conceptually important because it draws attention to the respective roles of individual and external forces on the cognitive elements of entrepreneurial action (cf. Shaver and Scott, 1991), but also to the subsequent effects that entrepreneurial action itself may have on the development, use, and consequences of these cognitive elements (cf. Weick, 1995).

If we are to contribute a better understanding of cognition in entrepreneurship, we need to disentangle the antecedent dynamics that fuel entrepreneurship cognition in the first place. In other words, we need to explore the origins and development of the cognitive factors that play a role in entrepreneurship. To further articulate this

Table III. Studying the antecedents of entrepreneurship cognition

	<i>Causes that predate entrepreneurial action</i>	<i>Causes that proceed from the tasks and circumstances of entrepreneurial action</i>
Individual/idiosyncratic causes	<p>How does genetics or one's unique family or educational background influence the development (in the past) of:</p> <ul style="list-style-type: none"> • cognitive styles? • reliance on decision heuristics? • ability to perceive certain patterns? • cognitive dimensions of social capital? • etc. 	<p>How do the unique characteristics of the opportunities/projects being pursued influence the development and use (in the present) of:</p> <ul style="list-style-type: none"> • cognitive styles? • reliance on decision heuristics? • ability to perceive certain patterns? • cognitive dimensions of social capital? • etc.
External/generic causes	<p>How does facing tasks and environments that stress uncertainty (in the past) influence the development of:</p> <ul style="list-style-type: none"> • cognitive styles? • reliance on decision heuristics? • ability to perceive certain patterns? • cognitive dimensions of social capital? • etc. 	<p>How does facing tasks and environments that stress uncertainty (in the present) influence the development and use of:</p> <ul style="list-style-type: none"> • cognitive styles? • reliance on decision heuristics? • ability to perceive certain patterns? • cognitive dimensions of social capital? • etc.

research, we encourage scholars to distinguish between the individual and external antecedents of entrepreneurship cognition, but also between factors that predate entrepreneurial action, and other influencing factors that proceed from the very experience of entrepreneurship, in and of itself. We illustrate the forms that such research could take in Table III.

For research on entrepreneurs' reliance on decision heuristics, for instance, the idea is to investigate (and compare) potential causes of this reliance. To explore whether some individuals self-select into entrepreneurial pursuits because of enduring decision styles, one could take advantage of existing longitudinal career surveys to infer the decision preferences of young adults and follow their ensuing career paths. One could also study whether nascent entrepreneurs who just began their entrepreneurial efforts already tend to rely more on decision heuristics than 'average' individuals. To investigate habituation and learning dynamics, one could investigate whether experienced and habitual entrepreneurs use decision heuristics more frequently and with more extent than nascent or novice entrepreneurs (cf. Ucbasaran et al., 2008; in press). Conversely, one would need to assess the effects of entrepreneurial tasks themselves, or of the information environments typical of entrepreneurship. For instance, it would be important to study whether nascent, experienced, and habitual entrepreneurs tend to rely on decision heuristics in most of the important decisions they make (e.g. buying a car or a house), or

only in those decisions that involve high levels of uncertainty for their business (e.g. investing in new equipment, expanding internationally). It would also be relevant to study whether the use of decision heuristics is influenced by characteristics of the information environments where entrepreneurial efforts are taking place. For instance, does the use of heuristics increase with the levels of complexity, innovativeness, dynamism, and/or uncertainty of the environment? By extension, one could study whether this influence of the environment results from perceived or objective characteristics.

Many relevant questions could be pursued along these lines, and for other cognitive variables and dynamics. From the standpoint of the research agenda we develop in this paper, the common denominator of these questions is to explore the origins and development of cognitive factors known to play a role in entrepreneurship. By exploring the different effects of internal and external forces that either predate entrepreneurial action or proceed from the tasks and circumstances of this action, one would contribute to disentangling the antecedent causes that fuel the unique aspects of entrepreneurship cognition. In other words, this research would speak to the source of entrepreneurs' 'cognitive difference'.

Articulating a Process Orientation

To address the limitations of past research and augment the contribution of cognitive research in entrepreneurship, it also becomes critical that scholars unpack the 'black box' of cognitive processes. Along with its dominant emphasis on the consequences of cognitive factors, past studies of entrepreneurship cognition have tended to emphasize either one of two broad types of cognitive variables: cognitive resources and abilities that support entrepreneurial efforts; or subjective perceptions, interpretations, and other mental representations of information signals and environments relevant to entrepreneurial efforts. By contrast, few studies have considered the interactions between these cognitive elements, not only with each other, but also with entrepreneurial action itself. From the standpoint of cognitive science's process orientation, however, this dichotomy has led to a limited consideration of cognition as a process. The net result has been a poor understanding of the reasons why some cognitive elements play particularly important roles in the thinking that enables and supports entrepreneurial action.

To augment the contribution of entrepreneurship cognition research in this regard, we encourage researchers to conduct empirical research highlighting the unfolding dynamics that influence the construction, transformation, and use of cognitive elements in the entrepreneurial process. This may call for longitudinal research or the use of techniques particularly suited to 'process research'. However, we contend that at a fundamental level, the articulation of cognitive science's process orientation in entrepreneurship cannot be reduced to a question of research methods: it concerns the very conceptualization of the role and place we want to give cognitive variables within our research models.

Building on the conceptual review above, and on our analyses of past entrepreneurship cognition research, we suggest that a useful strategy for unpacking the 'black box' of

cognitive processes is to conduct empirical studies that *simultaneously* consider the antecedents, representation, and/or consequences of cognitive resources *and* representations, as the two interact with one another. The case of recent research on opportunity recognition helps illustrate this point. Many studies have shown that prior knowledge is a primary factor explaining why some individuals are able to identify opportunities that others could not think of (cf. Corbett, 2005; Shane, 2000; Shepherd and DeTienne, 2005). These studies generally rest on Hayek's (1945) arguments that, because knowledge is not uniformly distributed in society, it can give unique information advantages to those individuals or firms who hold such resources (cf. Fiet, 1996, 2002). However, these studies are generally silent on the cognitive dynamics by which individuals are able to leverage these advantages (cf. Dimov, 2007b). As a result, we know that prior knowledge gives an advantage and we know whence this advantage comes, but we have much less to say about why prior knowledge effectively enables the identification of opportunities. To explore these issues, Grégoire et al. (2010a) developed a model of opportunity recognition that emphasizes individuals' reliance on cognitive processes of structural alignment. Using verbal protocol techniques, these authors investigated the manner with which entrepreneurs mobilized their prior knowledge to identify potential opportunities. They found that experienced entrepreneurs used their knowledge to draw cognitively meaningful parallels between the causes and effects of problems in markets they already knew about and the particular capabilities of new technologies they recently learned about. In other words, they showed how and why prior knowledge allowed some entrepreneurs to identify new patterns of meaning and draw the entrepreneurial implications of these patterns.

From a conceptual standpoint, the work of these authors illustrates an approach to investigate the unfolding of process interactions between relevant cognitive elements. In this particular case, these authors simultaneously considered the *representations* that individuals make of a particular situation (e.g. a new technology, a market), and the *consequences* that another cognitive element (e.g. prior knowledge) may have on *transforming* these representations to help derive new patterns of meaning (in this case, new opportunity beliefs). Because two phenomena are considered simultaneously in the same study, these authors can investigate interactions between mental representations and cognitive resources. As such, the conceptual articulation of their work allows them to document the cognitive processes through which prior knowledge can influence individuals' efforts to identify opportunities.

The same conceptual approach can be leveraged for studying the role of other cognitive resources and processes on opportunity recognition (cf. Dimov, 2007a; Grégoire et al., 2010b). From the standpoint of advancing entrepreneurship cognition research, the key point is to recognize that if we are to contribute knowledge on how, when, and why some cognitive elements play important roles in the thinking that fosters entrepreneurial action, it is critically important that we articulate cognitive science's process orientation. This is why we encourage research that focuses on the interactions between mental representations and cognitive resources, not only in terms of the mutual influence they have on each other, but also in terms of the implications that these interactions have for entrepreneurial action. By extension, and still in line with a view towards studying cognition as an evolving process, we encourage further research on the

implications of entrepreneurial action itself (and its success or failures) on the cognitive resources and mental representations that are known to play a role in entrepreneurship.

Studying the Unfolding of Cognition Across Levels of Analysis

To further advance knowledge on the dynamic interactions between mind and environment, it is also important to study the unfolding of entrepreneurship cognition across levels of analysis. To date however, few studies of entrepreneurship cognition have discussed such dynamics. Thus, it seems that expanding entrepreneurship cognition research across multiple levels of analysis would not only further the articulation of a process orientation, but also help address the interrogations that subsist about the source and nature of unique aspects of entrepreneurship cognition.

In this regard, Sarasvathy's research on effectuation has drawn attention to the cognitive implications of uncertainty and the consequent constraints it places on both information processing and the use of planning heuristics in entrepreneurship (cf. Sarasvathy, 2001, 2008). In turn, work on effectuation has shown that entrepreneurs' efforts to face these constraints had an important influence on individual and collective representations of market spaces. Although many opportunities and exploitation paths can be imagined, the entrepreneur succeeds by implementing and defending his/her own business conception as a tacit frame that is adopted by others (see also Witt, 1998). In essence, the entrepreneur successfully shares/sells a particular vision of what could be (cf. Sarasvathy, 2004; Sarasvathy and Dew, 2005). From the perspective of the present review, these works illustrate the potential of investigating the interactions between cognitive elements that are articulated at different levels of analysis (for instance, the cognitive strategies of individuals to make sense of their environment vs. the collective representations of that environment) – and how these interactions evolve over time.

At a broader conceptual level, an additional strategy for furthering the articulation of cognitive science's fundamental features in entrepreneurship cognition research rests in leveraging perspectives that specifically seek to capture process interactions across levels of analysis. In this regard, prior reviews of organizational cognition have sometimes opposed the computational/information-processing perspective and the interpretivist/sensemaking approaches (cf. Hodgkinson and Healey, 2008; Lant and Shapira, 2001). Instead of calling for more paradigmatic convergence on a particular approach (or for their eventual integration), however, we believe that more immediate advances in entrepreneurship cognition may be realized by leveraging perspectives that have yet to be fully integrated to our set of conceptual tools. In addition to the sensemaking and effectuation perspectives discussed above, we encourage more research on the theoretical, methodological, and empirical implications of embodied/situated cognition in entrepreneurship (cf. Elsbach et al., 2005; Haynie et al., 2010). Because they explicitly emphasize the interactions between multiple cognitive variables articulated at different levels of analysis, these perspectives would complement efforts grounded on the computational and interpretivist perspectives and further our understanding of the unfolding processes of entrepreneurship cognition.

OPPORTUNITIES FOR FUTURE RESEARCH

Having discussed the articulation of cognitive science's conceptual foundations in entrepreneurship cognition research, we build on the strategies above to identify specific opportunities for future research in particular areas. Instead of grouping these by topics (cf. Baron, 2007; Krueger, 2003) or stages of the entrepreneurship process (cf. Forbes, 1999; Shook et al., 2003), we build on our empirical observation that groups of papers that shared a particular disciplinary anchor tended to focus on particular sets of cognitive variables or factors. Accordingly, we discuss opportunities for entrepreneurship cognition research that draws from psychology, economics, sociology, and research at the interface between entrepreneurship and managerial/organizational cognition (MOC).

Future Research on Entrepreneurship Cognition Drawing from Psychology

The discipline of psychology provides an important anchor for many studies of entrepreneurship cognition. The dominant focus in this area, however, has been to study the consequences of cognitive variables primarily articulated as differences between individuals. Conversely, there has been less work on examining the antecedents of such variables, and their interactions with other variables at other levels of analysis. Among the myriad of possibilities one can imagine, valuable contributions could be made by exploring questions such as: What factors (individual, organizational, contextual) influence the acquisition and development of cognitive aptitude, abilities, knowledge or representations that appear to aid individuals, teams, firms, and/or societies in their entrepreneurial endeavours? To what extent do these factors proceed from individual dynamics and external constraints that predate entrepreneurial action? Conversely, to what extent are the effects of these factors reinforced by the unique circumstances of one's entrepreneurial pursuit(s), or by the conditions of the environment where this action takes place? By extension, does the repeated experience of entrepreneurial failure and/or success contribute to reinforce any of these cognitive factors? For instance, does the development of relevant abilities or representations differ between habitual and single-attempt entrepreneurs? Why?

To further explore the unfolding of entrepreneurship cognition as a process, we noted above the potential of exploring the interactions between cognitive resources and mental representations, not only on each other, but also with entrepreneurial action. In addition to studying the impact of such interactions on the identification of opportunities, it appears relevant to study the effect of these interactions on the decision to exploit particular opportunities, and/or on the persistence of one's efforts to do so. Assuming we know the decision criteria that entrepreneurs use to decide whether to pursue an opportunity (cf. Fiet, 2002; Haynie et al., 2009), to what extent is the reliance on these criteria influenced by one's cognitive style(s), abilities, knowledge, or use of decision heuristics? Conversely, to what extent is the reliance on these criteria influenced by one's perception of key characteristics of the environment?

Moving beyond the level of individual phenomena, we noted that few studies explored the link between team cognition and entrepreneurial firm performance (e.g. Ensley and Hmieleski, 2005; Ensley and Pearce, 2001; Shepherd and Krueger, 2002; West, 2007).

The relative paucity of work in this area leaves room for exploring a number of relevant questions: What factors affect the development of shared representations among founding teams? When, why, and with what consequences are the collective representations of an entrepreneurial team more than the sum of the representations of its individual members? Relative to the mental models of a lone entrepreneur, what are the pros and cons of shared cognition during the opportunity recognition and exploitation process? Does shared team cognition lead to more opportunities through the development of more products, multiple business models, or accelerated international development? Why? Under what circumstances?

Needless to say, many other questions could be imagined. From the perspective of the research agenda we propose in this article, our central message is that rich opportunities to advance the contribution of cognition research to entrepreneurship and the managerial sciences reside in disentangling the various antecedents of entrepreneurship cognition, to further the articulation of cognitive science's process orientation by studying the interactions between cognitive resources and mental representations, and to explore the unfolding of entrepreneurship cognition across levels of analysis.

Future Research on Entrepreneurship Cognition Drawing from Economics

In many ways, the dearth of studies at the interface of cognition and economics may reflect a historical reluctance of economists to examine how preferences are formed (Buchholz, 2007). With the return of economists' attention to issues such as economic growth, development, and wealth, there has been a rising interest in heterodox approaches to economics and, consequently, in understanding the cognitive underpinnings of market dynamics. Indeed, we note that Austrians (e.g. Lachmann, 1976; Shackle, 1979), neo-institutionalists (e.g. North, 2005), evolutionary economists (e.g. Witt, 1998, 2000), growth theorists (e.g. Audretsch and Keilbach, 2007), and entrepreneurship scholars (e.g. Chiles et al., 2010; McMullen and Shepherd, 2006; Sarasvathy, 2001) have had little choice but to confront cognitive variables such as knowledge, information, and imagination in their research on the economics of entrepreneurial action. In a dynamic economy, the value of production factors appears to become a function of the nomological network in which they are embedded (Companys and McMullen, 2007). Consequently, entrepreneurs become agents of change in more ways than one. In addition to reconfiguring and/or redistributing material resources, they redefine what a resource is by reinterpreting prior assumptions in light of new knowledge to imagine higher-valued uses for these inputs (Shepherd et al., 2007). Consequently, cognition is integral to explaining how entrepreneurs transform the exchange value of resources in an economy.

Given this rich theoretical background, important advances could be made by exploring relevant questions at the interface of entrepreneurship, economics, and cognition. Efforts to disentangle the antecedents of entrepreneurship cognition could include questions such as: What are the antecedents of the knowledge inputs that enable entrepreneurial agency? Are there isolating mechanisms or resources that allow entrepreneurs to escape the widespread ignorance suffered by others? What is the cognitive nature of such mechanisms or resources? Are these codified or tacit, generic or domain-specific,

content-related or process-related? In the same vein, efforts to explore the unfolding of entrepreneurship cognition as a process could include questions such as: Is scientific, technical, or supply-side knowledge more or less important than knowledge of the market in identifying, evaluating, and pursuing opportunities? Why? In what ways does the particular nature of an opportunity – or the characteristics of the environment – influence the relative importance of these different types of knowledge? By extension, efforts to study the articulation of entrepreneurship cognition across levels of analysis could include questions such as: Does it matter whether knowledge is concentrated or distributed, within or across levels of cognition? If it is concentrated in the entrepreneur, does this influence his or her cognition differently than it would if it were distributed across members of a team, organization, or industry? Given economists' general concern with performance, relevant questions could also include: What role does cognition play in creating information asymmetries at the industry level and hence competitive advantage? To what extent do cognitive variables and processes affect entrepreneurial success and failure, and what effect does this have on subsequent behaviour (cf. Ucbasaran et al., *in press*)?

Clearly, the assumptions, variables, and findings typically emphasized in cognitive science can inform economists' efforts to better understand market dynamics. Because economists generally prefer to operate at the level of differences between individuals (as opposed to variations within individuals), a focus on cognition may pose some boundary problems for those unwilling to examine antecedents and consequences of cognitive activities, such as imagination, which appear to occur within individuals. As far as economic studies of entrepreneurship are concerned, however, it is legitimate to acknowledge that imagination exists and to study what it does to the economy without necessarily examining how it works.

Future Research on Entrepreneurship Cognition Drawing from Sociology

We found two groups of sociology-anchored articles in our sample: research that draws from institutional theory to investigate issues of cognitive legitimacy (e.g. Aldrich and Fiol, 1994; Busenitz et al., 2000; Shepherd and Zacharakis, 2003), and research that draws from network sociology to explore the cognitive underpinnings and implications of social capital (e.g. De Carolis and Saporito, 2006; Lee and Jones, 2008; Ozgen and Baron, 2007). Interestingly, both groups were characterized by a relatively high degree of within-group focus on a particular variable (e.g. cognitive legitimacy in the first case, and the cognitive dimensions of social capital in the second). Yet, few studies in these areas considered the unfolding dynamics presiding over the emergence of such cognitive variables, or addressed the evolving interactions between their articulation at the macro and micro levels of analysis.

Thanks in large part to sociological work in entrepreneurship, there is a growing consensus that markets are socially embedded within a matrix of formal and informal institutions (Granovetter, 1985; Jack and Anderson, 2002; Simsek et al., 2003). Consequently, entrepreneurial action is likely to be motivated by more than financial returns. For example, socio-cultural norms or belief systems are likely to complement or supplement economic incentives to shape the amount and type of entrepreneurship seen by

individuals within organizations or nations. Building on such notions, a number of relevant questions could be pursued that call for research at the interface between entrepreneurship cognition and sociology: What are the interactions between societal norms and individual representations? For instance, how do social institutions influence entrepreneurial perception, and what effect does this perception have on entrepreneurship cognition? Conversely, what are the effects of cognitive aptitude, abilities, etc. on the emergence and/or transformation of social norms, for instance during the formative years of a growing organization? How do social institutions influence attitudes regarding entrepreneurial action, and how do the latter transform these social institutions in return? What are the effects of success and failures in such dynamics? Is the type of entrepreneurship that occurs within a society bounded by socio-cognitive factors or dynamics? For instance, do entrepreneurs become more likely to engage in non-productive types of entrepreneurship if they think that others engage in such behaviour? If so, why and who are these others? Are they competitors, colleagues, or friends? In broader terms, what is the nature and extent of interactions between networks and entrepreneurship cognition? In sum, we offer that significant opportunities abound for articulating the agenda we develop in this paper to advance entrepreneurship cognition research that draws from sociology.

Future Research at the Interface of Entrepreneurship, Managerial, and Organizational Cognition

In the broader management and organization sciences, scholars have used the cognitive perspective to better understand the factors and dynamics affecting activities as diverse as personnel selection and assessment, work groups and teams, training and development, stress and occupational health, work motivation, work design and ergonomics, leadership, organizational decision-making, organization change and development, and the impact of individual differences in management and organizations (cf. Hodgkinson and Healey, 2008). Against such a rich and dynamic backdrop, however, research at the interface of entrepreneurship cognition and the broader area of management and organizational cognition (MOC) appears diverse but does not appear to have coalesced around strong organizing themes. For instance, our analyses indicated that the 17 entrepreneurship–MOC articles in our sample have collectively investigated more than 25 variables of cognitive interest, and virtually every study pursued its own distinct set of research question(s), model(s), and variable(s). Furthermore, we note that for most of the 1980s and 1990s, research in this area used the term ‘cognition’ to refer to any ‘thinking’ taking place in organizations: some defined this ‘thinking’ as a counterpart to ‘acting’ (e.g. Burgelman, 1988), whereas others emphasized the idiosyncratic perceptions and interpretations of relevant actors (e.g. Cossette and Audet, 1992; Hellström and Hellström, 2002; Johannisson and Huse, 2000). But as we showed above, a concern for the subjective perceptions and interpretations of relevant actors is a necessary but not sufficient condition for fully realizing the theoretical potential of cognitive science. Accordingly, we propose that a relevant avenue for augmenting the contribution of research at the interface between entrepreneurship and MOC is to articulate the conceptual foundations noted above.

First, entrepreneurship cognition research is in a unique position to advance knowledge on the origins and development of cognitive dynamics that prove important in established and mature organizations. Gartner has long made the case for defining entrepreneurship as the study of organization emergence (cf. Gartner, 1993; Gartner et al., 1992). Because of the preponderant influence they have on their nascent organizations, founders and entrepreneurs are the primary shapers of their firm's internal identity and external image. Even before they have formally established the organization, entrepreneurs have helped launch narratives that will structure the later developments of their organizations. They help determine the first routines of their organizations and generally play a role in efforts to adapt these routines and to further organizational learning. Needless to say, the study of emerging organizations offers countless opportunities to advance scholarly understanding of the development and use of important phenomena in managerial and organization cognition. Realization of such advances, however, begins with better articulation of the complex dynamics between cognition at the level of the individual entrepreneur and the founding team, and may eventually lead to consideration of cognition at the level of the growing organization itself.

Second, the articulation of cognitive science's process orientation draws attention to the unfolding of entrepreneurship cognition dynamics in organizations. In this regard, a number of past works have claimed that because of the particular challenges they face (such as dealing with uncertainty, ambiguity, limited resources, or other liabilities), individual entrepreneurs (and individuals within entrepreneurial organizations) have to 'think' differently (e.g. Etzkowitz, 1998; Russell, 1999). Along these lines, Jelinek and Litterer (1995) suggested that the successful development and conduct of entrepreneurial organizations rests on at least three elements: 'pervasive sharing of managerial tasks and responsibilities, mindful alertness to anomalies, and ambiguity absorption by means of mutual support and information sharing' (p. 137). But are these the only relevant managerial practices? And perhaps more fundamentally, how can we establish whether and why these practices are so important?

Building on our discussion of cognition research, we offer that it is not enough to claim that these strategies are important because they involve unique modes of thinking or interpretation that are associated with desirable entrepreneurship outcomes. We also need to uncover the cognitive reasons why these strategies are important. One possible avenue for doing so is to investigate the manner with which thinking individuals (whether alone, in teams, or in organizations) develop, use, share, and/or modify the cognitive strategies that are known to influence managerial and organizational activities that are important for entrepreneurship. For instance, Wright et al. (2000) proposed that the form and upside potential of management buyouts was not only influenced by the types of managerial incentives in place, but also by the cognition mode of individual decision-makers (managerial vs. entrepreneurial). But if we are to advance knowledge on an entrepreneurial mode of cognition that emphasizes the reliance upon decision heuristics, it becomes important to not only investigate the impact that such a mode has on buyout success and other managerial achievements, but to also (and simultaneously) research the antecedent forces that preside over the development of this mode of cognition, as well as the individual, organizational, and contextual factors that enhance, constrain, or inhibit its use.

Another avenue for furthering research at the interface of entrepreneurship and MOC lies in studying the interactions between cognitive dynamics that operate at different levels of analysis. In a recent paper on the efforts of multinational enterprises (MNEs) to recognize entrepreneurial opportunities, Mahnke et al. (2007) propose that MNEs' acceptance of an opportunity depends on the levels of communicative, behavioural, and value uncertainty surrounding the opportunity: the higher the uncertainty, the lower the acceptance. They then point to different managerial practices that would affect the perception of uncertainty at the local level. For instance, they propose that delegating authority to local managers with expert knowledge will reduce communicative uncertainty, and that self-enforceable high-powered incentives, contingent career promises, deferred payment structures, or clan control would reduce behavioural and value uncertainty. In other words, they take advantage of the unique structure of MNEs to explore how cognitive dynamics at the level of local managers can influence cognitive dynamics in the global organization structure.

Lastly, a potentially interesting avenue for future research in this area is to explore the implications of situated cognition arguments in contexts where entrepreneurs are in the very process of creating new organizations and markets. Prior studies of situated cognition have largely been focused on individual-level dynamics (e.g. Haynie et al., 2010); but how do these dynamics operate in organizational settings? More importantly, how do these dynamics participate in the emergence of new organizations and markets? Examining the context of nascent organizations could make timely and relevant contributions to understanding how organizations' systems of meaning, structures, and strategies are defined and transformed, particularly in ambiguous, complex, or critical situations (cf. Weick, 1995).

Limitations and Implications for Future Reviews

Naturally, this study is not without limitations. Reviewers may question our portrayal of the conceptual foundations of cognitive science as superficial, misdirected, or as focusing attention on orthodox models of cognition. Given the dearth of discussions on the nature and implications of cognitive science in entrepreneurship, however, we made explicit effort to represent many different perspectives, and more importantly, to emphasize the common foundations that these perspectives share. Critics may also question the exhaustiveness of our sample, and thus the rigour and validity of our observations. We readily acknowledge that relevant articles may have escaped our sampling procedures. Yet, we argue that by conducting a series of relevant keyword searches on three different databases, we not only minimized this possibility, but also maximized the likelihood that we obtained a sample that is both conceptually valid and statistically representative. Lastly, observers could question the means we used to assess the state of entrepreneurship cognition research. For instance, we could have analysed the content, methods, or references of our articles to identify common patterns in their use of theories, constructs, research strategies, or other approaches. However, such analyses do not necessarily reflect the conceptual challenges and issues hindering the advancement of entrepreneurship cognition research, nor do they point towards opportunities for overcoming these. By analysing the manner and extent with which entrepreneurship cognition research

articulates three key conceptual features of cognitive science, our work illustrates an approach that significantly departs from prior reviews, and offers theoretically-consistent avenues to augment the contribution of future research.

CONCLUSION

As Walsh (1995, p. 302) reminded all, the contribution of any critical review 'is to question our accumulated wisdom and push ourselves to build an even more rigorous and relevant program'. Research on entrepreneurship cognition has made significant advances since Comegys' (1976) article on the role of entrepreneurs' cognitive styles. Still, challenges and limitations remain. Unlike prior reviews, we do not think that addressing these challenges calls for more paradigmatic convergence on a particular theory, nor on particular variables or phenomena. Rather, we believe it calls for more conscious and deliberate reflections about the extent and manner with which we leverage key conceptual features of cognitive science in our research. To encourage the continuing evolution of entrepreneurship cognition research and augment its contribution to the managerial sciences, our paper developed the following agenda:

- (1) To better understand the role of cognition in entrepreneurship (and the unique particularities of entrepreneurial cognition and its various aspects), we encourage future research to pay attention not only to the consequences of relevant cognitive variables, but also to the *origins and development* of such variables. To this aim, we call for scholars to distinguish between cognitive factors that *predate* entrepreneurial action and factors that proceed from the immediate circumstances of that action and to study these distinctions specifically.
- (2) To better understand how, when, and why different cognitive variables play a role in entrepreneurship, we encourage that future research fully articulate cognitive science's *process orientation*. To this aim, we call for scholars to study the interactions between cognitive resources and mental representations and to conduct studies that simultaneously consider two or more phenomena of cognitive relevance (Walsh, 1995).
- (3) To better capture the dynamic relationships between mind, environment, and entrepreneurial action, we encourage future research to consider simultaneously the role and interactions of different variables of cognitive interest articulated at different levels of analysis.

We look forward to joining others in continuing to explore the vast and rich territory of entrepreneurship cognition, and thus to advance knowledge in entrepreneurship and the broader managerial sciences.

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Any error, omission, or limitation remains the responsibility of the authors.

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APPENDIX 1: ESTABLISHING THE SAMPLE'S CONTENT VALIDITY AND REPRESENTATIVITY

The keyword search on the three reference databases generated a 'raw' total of 795 unique entries published in peer-reviewed journals for the period 1976–2008 (sampling criteria 1–3 from Table I). But these entries included a very diverse set of documents, not all of which are relevant to entrepreneurship cognition research. To increase the validity of our sample, we removed all documents that were not published in academic journals listed in Thomson Reuter's Social-Science Citation Index[®], and as full-length research articles or research notes (sampling criteria 4–5). This reduced the total number of articles to 250 entries.

We then examined all remaining documents for content relevance. For instance, our search identified articles that focused on the 'founder(s)' of particular schools of thought, or on the 'emergence' of particular techniques or lines of research in cognitive science. Although these articles used relevant keywords, they hardly seek to advance scholarly research on entrepreneurship cognition.

To address this issue, two of the authors independently sifted the remaining documents and determined whether there were sufficient indications in the title, place of publication, and abstract of each article to warrant its inclusion in the final sample. When such indications were ambiguous (or when in doubt), we obtained a copy of the entire article, and examined it more closely to assess its relevance to the domain of entrepreneurship cognition. Two primary criteria guided our evaluation:

- Whether the article investigated anything relevant to entrepreneurship research (as per the Domain Statement of the Academy of Management's Entrepreneurship Division (<http://division.aomonline.org/ent/EntprDivGenInfo.htm>).
- Whether the article in question investigated anything that could reasonably be said to involve a cognitive dimension (as in the broad conception reviewed above).

To the extent that the two coders answered positively to both questions, we kept the article in the sample. The two authors agreed on the inclusion/exclusion of all articles in the sample before proceeding with the analyses. We also revised all our rejection decisions after we had analysed the final sample to ensure that we had not primarily rejected articles that were relevant. We re-coded four such articles.

The procedures described above generated a final sample of 154 entrepreneurship cognition articles published in 47 different academic journals between 1976 and 2008. Given the rigorous procedures we followed, we offer that although it may not be

perfectly exhaustive, this sample is characterized by a high degree of content validity, and is representative of the best research conducted at the interface of entrepreneurship and cognition. The full list of references is available by request to any of the authors.

APPENDIX 2: DATA ANALYSIS, CODING SCHEMES, AND PROCEDURES

A Focus on the Cognitive Elements of Human Action

To assess the focus of entrepreneurship cognition research on the cognitive elements of human action, we inventoried the list of relevant variables and constructs of cognitive interest that scholars investigated in our sample of 154 articles. We use the term ‘of cognitive interest’ to highlight these variables that, in each paper, correspond to the assumptions, ontology, and epistemological outlook that are characteristic of the cognitive perspective – as reviewed above. Our labelling of a variable as ‘of cognitive interest’ is meant to be inclusive. It does not rest on a conception of cognition that is more closely associated with a particular discipline (e.g. psychological research) or with a particular approach to cognition (e.g. computational vs. sensemaking, effectuation, situated, embodied, etc.). In this sense, we follow a broad conception of cognitive science in which the term ‘of cognitive interest’ relates to any kind of mental operation or structure that can be studied in precise terms (cf. Lakoff and Johnson, 1999).

We relied on three main indicators to identify variables of cognitive interest studied among our sample of 154 entrepreneurship cognition articles. First, several papers explicitly specify the cognitive dimension of particular variables, labelling them as such. This is the case of Aldrich and Fiol’s (1994) introduction of the term ‘cognitive legitimacy’, and for papers that distinguish between cognitive and affective conflict (e.g. Ensley et al., 2002; Higashide and Birley, 2002). Second, we relied extensively on the figure(s) where authors illustrate the phenomena, dynamics, effects, models, and/or relationships they are studying. When available, we also used the specific propositions and/or hypotheses advanced by the authors. In all cases, we looked for indications that the author(s) of a text conceive(s) of particular variables as involving a specifically cognitive dimension or dynamic – however these authors define it. Third, we relied on our knowledge of the literature to identify instances when a variable is so commonly associated with the cognitive perspective that it would be redundant to label it as such. This is often the case for concepts that find their origins in cognitive and social psychology, such as attributions, self-efficacy, biases, and heuristics in decision-making, etc.

The Articulation of a Process Orientation

From a methods standpoint, indicators of a process orientation generally include the conduct of longitudinal research, the study of moderation and mediation effects, the

investigation of feedback loops, and/or the use of particular data collection techniques (such as case studies, verbal protocols, and ethnographic observations). To assess the articulation of a process orientation *on conceptual grounds*, however, we build on Walsh's (1995) seminal review of managerial and organizational cognition research, and particularly on the framework he developed to review research on the content and structure of knowledge structures (cf. Walsh, 1995, pp. 282–3). Walsh posits that management and organization scholars using a cognitive perspective to study knowledge structures can focus their research on three phenomena of cognitive interest: (1) the *representation* and *attributes* of knowledge structures (e.g. their nature, content, characteristics, and organization); (2) the *origins* and *antecedents* of these knowledge structures; and (3) the *use* and *consequences* of these knowledge structures.

With these considerations in mind, we postulate that different forms of research have different implications for the articulation of a process orientation in cognition research. For instance, representation research that focuses solely on the content or attributes of a mental construct is conceptually static; it can only offer limited insights about the unfolding dynamics of cognition, except perhaps when such research compares the representations between units of analysis or within units but at different times. Research on the antecedents or consequences of a cognitive variable or phenomena are comparatively more informative, in the sense that they explore causal relationships between two or more variables. But in practice, such research may not necessarily capture unfolding changes in mental representations and structures. For instance, research can show that individuals with higher metacognitive abilities are more likely than others to identify opportunities (cf. Haynie et al., 2010). It is quite a different challenge, however, to directly observe how and why individuals mobilize these metacognitive abilities in the task of identifying opportunities. This would require one to observe how and why metacognitive abilities interact with the construction and use of mental representations – i.e. research that focuses on both representation and consequences. From a conceptual standpoint, we thus suggest that the more phenomena of cognitive interest a study considers, simultaneously, the more informative it can be about cognitive processes. In other words, the more complex the articulation of research in terms of Walsh's (1995) phenomena of cognitive interest, the more it epitomizes the articulation of cognitive science's process orientation.

Following this logic, we coded whether the object of a paper was primarily concerned with (a) the attributes and characteristics of a cognitive phenomenon; (b) the antecedents and origins of that phenomenon; (c) the outcomes and consequences of that phenomenon; or (d) other types of phenomena. Of notable importance for our analyses, we allowed for articles to be concerned with more than one phenomenon. As noted above, the focus of two or more phenomena of interest (say, antecedents and representation or representation and consequences) reflects that a study conceptually articulates process dynamics between different phenomena of cognitive interest – as opposed to solely describing the attributes/characteristics of a cognitive construct, its antecedents, or consequences.

The Operation of Entrepreneurship Cognition Across Levels of Analysis

To assess the study of entrepreneurship cognition dynamics across levels of analysis, we coded whether an article aimed at making inferences about cognitive variables/processes articulated as variations within or between individuals, groups, firms, industries, countries, or information stimuli/contexts. As with the coding schemes above, we allowed for articles to be concerned with two or more cognitive variables articulated at different levels of analysis. As noted above, the focus on two or more levels of analysis (e.g. individual and contextual variations) within the same study denotes that this study conceptually articulates cognitive dynamics between levels of analysis.

Additional Dimensions of Analysis

In addition to the above dimensions, we document the integration of entrepreneurship cognition research on a series of different disciplinary anchors. Concretely, we code whether each article in our sample is explicitly or implicitly anchored on the disciplines of economics, sociology, psychology, organizational sciences, or others. Although we do not make any claims that the anchoring on a particular discipline is superior to the anchoring on another, or that the anchoring on multiple disciplines is superior to the anchoring on a single discipline, this data provides us with additional information to identify groups of papers that focus on related variables, topics, or phenomena. In practice, this coding also allows us to explore whether the articulation of cognitive science's fundamental features varies between groups of papers with different anchors.

We also document the proportion of theoretical and empirical works in entrepreneurship cognition research. By drawing attention to this distinction, we do not mean to imply that one is superior to the other. Like Walsh (1995), we acknowledge that studying cognition empirically presents a number of methodological challenges. Accordingly, it becomes worthwhile 'to establish which ideas are supported by empirical evidence and which ideas are not (and) to flag and assess the efforts of those who have made progress in empirical research' (p. 285).

Coding Procedures

Two of us independently coded all articles. Following the procedures recommended in Krippendorff (2004) and Neuendorf (2002), the coders began by coding a training sub-sample of 14 articles randomly sampled from the larger corpus. The two authors coded each article independently and then met to discuss the operationalization of the coding schemes and disparities in the results. After discussion, the two authors re-coded all 14 articles and met a second time to discuss all remaining issues. Having agreed on a final operationalization for the codes, the two proceeded to code all remaining articles.

In order to document the variables of cognitive interest that were studied in the 154 articles in our sample, the two authors created synthetic summaries of the research

model(s) developed, advanced, or tested in each paper in our sample. In turn, the two identified from these models the variables that were of cognitive interest, and noted the articulation of these variables as either independent/explanatory or dependent/explained. Whereas the focus on independent and dependent variables is often associated with a hypothetico-deductive approach that stresses the testing of causal relationships, we made explicit efforts to adapt our coding to articles that follow different epistemological approaches. For articles that do not include figures, models, and/or propositions or hypotheses, we paid close attention to identifying the ‘concepts’ and ‘dynamics’ that these authors were emphasizing in their research. The lists and model summaries generated by the two authors proved highly similar. To ensure consistency and minimize omissions, the first author compared the lists of variables generated by the two coders and synthesized the final list. The coding for the other dimensions of analysis followed the coding schemes summarized in Table II.

Assessment of Reliability

We calculated two indices of inter-rater reliability for the relevant coding dimensions: percentage agreement and Krippendorff’s α . We reached the following levels of reliability: 92.2 per cent agreement ($\alpha = 0.87$) for the cognitive phenomena of interest; 91.6 per cent agreement ($\alpha = 0.88$) for the level of analysis of relevant cognitive variables; 92.4 per cent agreement ($\alpha = 0.87$) for the disciplinary anchor of each article; and 97.4 per cent agreement ($\alpha = 0.95$) for the theoretical/empirical nature of each article. These results indicate adequate levels of inter-rater reliability. The coders discussed discrepancies, revised the analyses of contentious papers, and reached 100 per cent agreement on all divergent instances before proceeding to the final analyses.

REFERENCES

- Aldrich, H. E. and Fiol, C. M. (1994). ‘Fools rush in? The institutional context of industry creation’. *Academy of Management Review*, **25**, 645–70.
- Alvarez, S. A. and Busenitz, L. W. (2001). ‘The entrepreneurship of resource-based theory’. *Journal of Management*, **27**, 755–75.
- Anderson, J. R. (1983). *The Architecture of Cognition*. Cambridge, MA: Harvard University Press.
- Anderson, M. H. and Nichols, M. L. (2007). ‘Information gathering and changes in threat and opportunity perceptions’. *Journal of Management Studies*, **44**, 367–87.
- Audretsch, D. B. and Keilbach, M. (2007). ‘The theory of knowledge spillover entrepreneurship’. *Journal of Management Studies*, **44**, 1242–54.
- Baron, R. A. (1998). ‘Cognitive mechanisms in entrepreneurship: why and when entrepreneurs think differently than other people’. *Journal of Business Venturing*, **13**, 275–94.
- Baron, R. A. (2000). ‘Counterfactual thinking and venture formation: the potential effects of thinking about “what might have been”’. *Journal of Business Venturing*, **15**, 79–91.
- Baron, R. A. (2004). ‘The cognitive perspective: a valuable tool for answering entrepreneurship’s basic “why” questions’. *Journal of Business Venturing*, **19**, 221–39.
- Baron, R. A. (2007). ‘Behavioral and cognitive factors in entrepreneurship: entrepreneurs as the active element in new venture creation’. *Strategic Entrepreneurship Journal*, **1**, 167–82.
- Baron, R. A. and Ward, T. B. (2004). ‘Expanding entrepreneurial cognition’s toolbox: potential contributions from the field of cognitive science’. *Entrepreneurship Theory and Practice*, **28**, 553–74.

- Bingham, C. B., Eisenhardt, K. M. and Furr, N. R. (2007). 'What makes a process a capability? Heuristics, strategy, and effective capture of opportunities'. *Strategic Entrepreneurship Journal*, **1**, 27–48.
- Bishop, R. C. (2005). 'Cognitive psychology: hidden assumptions'. In Slife, B., Reber, J. and Richardson, F. (Eds), *Critical Thinking About Psychology: Hidden Assumptions and Plausible Alternatives*. Washington, DC: American Psychological Association, 151–70.
- Breslin, D. (2008). 'A review of the evolutionary approach to the study of entrepreneurship'. *International Journal of Management Reviews*, **10**, 399–423.
- Broadbent, D. (1958). *Perception and Communication*. London: Pergamon Press.
- Bruner, J. (1990). *Acts of Meaning: Four Lectures on Mind and Culture*. Cambridge, MA: Harvard University Press.
- Buchholz, T. G. (2007). *New Ideas from Dead Economists*, 2nd revised edition. New York: Plume.
- Burgelman, R. A. (1988). 'Strategy making as a social learning process: the case of internal corporate venturing'. *Interfaces*, **18**, 74–85.
- Busenitz, L. W. and Barney, J. B. (1997). 'Differences between entrepreneurs and managers in large organizations: biases and heuristics in strategic decision-making'. *Journal of Business Venturing*, **12**, 9–30.
- Busenitz, L. W., Gomez, C. and Spencer, J. W. (2000). 'Country institutional profiles: unlocking entrepreneurial phenomena'. *Academy of Management Journal*, **43**, 994–1003.
- Busenitz, L. W., West, III, G. P., Shepherd, D. A., Nelson, T., Chandler, G. N. and Zacharakis, A. (2003). 'Entrepreneurship research in emergence: past trends and future directions'. *Journal of Management*, **29**, 285–308.
- Chiles, T. H., Tugglesworth, C. S., McMullen, J. S., Bierman, L. and Greening, D. W. (2010). 'Dynamic creation: extending the radical Austrian approach to entrepreneurship'. *Organization Studies*, **31**, 7–46.
- Cialdini, R. B., Petty, R. E. and Cacioppo, J. T. (1981). 'Attitudes and attitude change'. *Annual Review of Psychology*, **32**, 357–404.
- Comegys, C. (1976). 'Cognitive dissonance and entrepreneurial behavior'. *Journal of Small Business Management*, **14**, 1–6.
- Company, Y. E. and McMullen, J. S. (2007). 'Strategic entrepreneurs at work: the nature, discovery, and exploitation of entrepreneurial opportunities'. *Small Business Economics*, **28**, 301–22.
- Corbett, A. C. (2005). 'Experiential learning within the process of opportunity identification and exploitation'. *Entrepreneurship Theory and Practice*, **29**, 473–91.
- Cossette, P. and Audet, M. (1992). 'Mapping of an idiosyncratic schema'. *Journal of Management Studies*, **29**, 325–47.
- De Carolis, D. and Saporito, P. (2006). 'Social capital, cognition, and entrepreneurial opportunities: a theoretical framework'. *Entrepreneurship Theory and Practice*, **30**, 41–56.
- Dimov, D. (2007a). 'Beyond the single-person, single-insight attribution in understanding entrepreneurial opportunities'. *Entrepreneurship, Theory and Practice*, **31**, 713–32.
- Dimov, D. (2007b). 'From opportunity insight to opportunity intention: the importance of person-situation learning match'. *Entrepreneurship, Theory and Practice*, **31**, 561–84.
- Dodge, Y. (2003). *The Oxford Dictionary of Statistical Terms*. Oxford: Oxford University Press.
- Elsbach, K. D., Barr, P. S. and Hargadon, A. B. (2005). 'Identifying situated cognition in organizations'. *Organization Science*, **16**, 422–33.
- Ensley, M. D. and Hmieleski, K. M. (2005). 'A comparative study of new venture top management team composition, dynamics and performance between university-based and independent start-ups'. *Research Policy*, **34**, 1091–105.
- Ensley, M. D. and Pearce, C. L. (2001). 'Shared cognition in top management teams: implications for new venture performance'. *Journal of Organizational Behavior*, **22**, 145–60.
- Ensley, M. D., Pearson, A. W. and Amason, A. C. (2002). 'Understanding the dynamics of new venture top management teams: cohesion, conflict, and new venture performance'. *Journal of Business Venturing*, **17**, 365–86.
- Etzkowitz, H. (1998). 'The norms of entrepreneurial science: cognitive effects of the new university-industry linkages'. *Research Policy*, **27**, 823–33.
- Fiet, J. O. (1996). 'The informational basis of entrepreneurial discovery'. *Small Business Economics*, **8**, 419–30.
- Fiet, J. O. (2002). *The Systematic Search for Entrepreneurial Discoveries*. Westport, CT: Quorum Books.
- Fiske, S. T. and Taylor, S. E. (1991). *Social Cognition*, 2nd edition. New York: McGraw-Hill.
- Foo, M.-D., Uy, M. A. and Baron, R. A. (2009). 'How do feelings influence effort? An empirical study of entrepreneurs' affect and venture effort'. *Journal of Applied Psychology*, **94**, 1086–94.
- Forbes, D. P. (1999). 'Cognitive approaches to new venture creation'. *International Journal of Management Reviews*, **1**, 415–39.

- Forbes, D. P. (2005). 'Are some entrepreneurs more overconfident than others?'. *Journal of Business Venturing*, **20**, 623–40.
- Gaglio, C. M. (2004). 'The role of mental simulations and counterfactual thinking in the opportunity identification process'. *Entrepreneurship Theory and Practice*, **28**, 533–52.
- Gardner, H. (1985). *The Mind's New Science: A History of the Cognitive Revolution*. New York: Basic Books.
- Gartner, W. B. (1993). 'Words lead to deeds: toward an organizational emergence vocabulary'. *Journal of Business Venturing*, **8**, 231–40.
- Gartner, W. B. (2007). 'Psychology, entrepreneurship, and the "critical mess"'. In Baum, J. R., Frese, M. and Baron, R. A. (Eds), *The Psychology of Entrepreneurship*. Mahwah, NJ: Lawrence Erlbaum Associates, 325–34.
- Gartner, W. B., Bird, B. J. and Starr, J. A. (1992). 'Acting as if: differentiating entrepreneurial from organizational behavior'. *Entrepreneurship Theory and Practice*, **16**, 13–31.
- Gatewood, E. J., Shaver, K. G. and Gartner, W. B. (1995). 'A longitudinal study of cognitive factors influencing start-up behaviors and success at venture creation'. *Journal of Business Venturing*, **10**, 371–91.
- Gibbs, R. W. J. (2006). *Embodiment and Cognitive Science*. Cambridge, MA: Cambridge University Press.
- Gigerenzer, G. (1996). 'On narrow norms and vague heuristics: a rebuttal to Kahneman and Tversky (1996)'. *Psychological Review*, **103**, 592–6.
- Gigerenzer, G. (2006). 'Bounded and rational'. In Stainton, R. J. (Ed.), *Contemporary Debates in Cognitive Science*. Oxford: Blackwell, 115–33.
- Granovetter, M. (1985). 'Economic action and social structure: the problem of embeddedness'. *American Journal of Sociology*, **91**, 481–510.
- Grégoire, D. A., Barr, P. S. and Shepherd, D. A. (2010a). 'Cognitive processes of opportunity recognition: the role of structural alignment'. *Organization Science*, **21**, 413–31.
- Grégoire, D. A., Shepherd, D. A. and Lambert, L. S. (2010b). 'Measuring opportunity-recognition beliefs: illustrating and validating an experimental approach'. *Organizational Research Methods*, **13**, 114–45.
- Hayek, F. A. V. (1945). 'The use of knowledge in society'. *American Economic Review*, **35**, 519–30.
- Haynie, J. M., Shepherd, D. A. and McMullen, J. S. (2009). 'An opportunity for me? The role of resources in opportunity evaluation decisions'. *Journal of Management Studies*, **46**, 337–61.
- Haynie, J. M., Shepherd, D. A., Mosakowski, E. and Earley, P. C. (2010). 'A situated metacognitive model of the entrepreneurial mindset'. *Journal of Business Venturing*, **25**, 217–29.
- Hellström, T. and Hellström, C. (2002). 'Time and innovation in independent technological ventures'. *Human Relations*, **55**, 407–26.
- Higashide, H. and Birley, S. (2002). 'The consequences of conflict between the venture capitalist and the entrepreneurial team in the United Kingdom from the perspective of the venture capitalist'. *Journal of Business Venturing*, **17**, 59–81.
- Hisrich, R., Langan-Fox, J. and Grant, S. (2007). 'Entrepreneurship research and practice: a call to action for psychology'. *American Psychologist*, **62**, 575–89.
- Hodgkinson, G. P. and Healey, M. P. (2008). 'Cognition in organizations'. *Annual Review of Psychology*, **59**, 387–417.
- Huda, A. B. and Al-Maskati, T. (1997). 'Contextual influences on thinking in organizations: learner and tutor orientations to organizational learning'. *Journal of Management Studies*, **34**, 851–70.
- Huff, A. S. (1997). 'A current and future agenda for cognitive research in organizations'. *Journal of Management Studies*, **34**, 947–52.
- Huff, A. S., Huff, J. O. and Barr, P. S. (2000). *When Firms Change Direction*. Oxford: Oxford University Press.
- Jack, S. L. and Anderson, A. R. (2002). 'The effects of embeddedness on the entrepreneurial process'. *Journal of Business Venturing*, **17**, 467–87.
- Jelinek, M. and Litterer, J. A. (1995). 'Toward entrepreneurial organizations: meeting ambiguity with engagement'. *Entrepreneurship Theory and Practice*, **19**, 137–68.
- Johannisson, B. and Huse, M. (2000). 'Recruiting outside board members in the small family business: an ideological challenge'. *Entrepreneurship and Regional Development*, **12**, 353–78.
- Kahneman, D. and Tversky, A. (1996). 'On the reality of cognitive illusions'. *Psychological Review*, **103**, 582–91.
- Katz, J. A. and Shepherd, D. A. (2003). 'Cognitive approaches to entrepreneurship research'. In Katz, J., Shepherd, A. and Shepherd, D. A. (Eds), *Advances in Entrepreneurship, Firm Emergence and Growth – Volume 6: Cognitive Approaches to Entrepreneurship Research*. Oxford: Elsevier, JAI, 1–10.
- Kirshner, D. and Whiston, J. A. (1997). *Situated Cognition: Social, Semiotic, and Psychological Perspectives*. Mahwah, NJ: Erlbaum.
- Klein, G., Moon, B. and Hoffman, R. F. (2006). 'Making sense of sensemaking. II: A macrocognitive model'. *IEEE Intelligent Systems*, **21**, 88–92.

- Krippendorff, K. (2004). *Content Analysis: An Introduction to Its Methodology*, 2nd edition. Thousand Oaks, CA: Sage.
- Krueger, N. F. J. (2003). 'The cognitive psychology of entrepreneurship'. In Acs, Z. J. and Audretsch, D. B. (Eds), *Handbook of Entrepreneurship Research: An Interdisciplinary Survey and Introduction*. New York: Springer, 105–40.
- Lachmann, L. (1976). 'From Mises to Shackle: an essay on Austrian economics and the kaleidic society'. *Journal of Economic Literature*, **14**, 54–62.
- Lakoff, G. and Johnson, M. (1999). *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought*. New York: Basic Books.
- Lant, T. (1999). 'A situated learning perspective on the emergence of knowledge and identity in cognitive communities'. In Garud, R. and Porac, J. F. (Eds), *Advances in Managerial Cognition and Organizational Information Processing*. Greenwich, CT: JAI, 171–94.
- Lant, T. K. and Shapira, Z. (2001). 'Introduction: Foundations of research on cognition in organizations'. In Lant, T. K. and Shapira, Z. (Eds), *Organizational Cognition*. Mahwah, NJ: Lawrence Erlbaum Associates, 1–14.
- Lee, R. and Jones, O. (2008). 'Networks, communication and learning during business start-up'. *International Small Business Journal*, **26**, 559–94.
- Lovullo, D., Powell, T. C., Fox, C. R. and Teece, D. J. (2008). 'Special issue call for paper: psychological foundations of strategic management'. *Strategic Management Journal*. Available at: http://strategicmanagement.net/pdfs/SMJ_Special_Issues_Call_for_Papers.pdf (accessed 25 January 2010).
- Mahnke, V., Venzin, M. and Zahra, S. (2007). 'Governing entrepreneurial opportunity recognition in MNEs: aligning interests and cognition under uncertainty'. *Journal of Management Studies*, **44**, 1278–98.
- March, J. G. and Simon, H. A. (1958). *Organizations*. New York: Wiley.
- McMullen, J. S. and Shepherd, D. A. (2006). 'Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur'. *Academy of Management Review*, **31**, 132–52.
- McNamara, G. and Bromiley, P. (1997). 'Decision making in an organizational setting: cognitive and organizational influences on risk assessment in commercial lending'. *Academy of Management Journal*, **40**, 1063–88.
- Mitchell, R. K., Busenitz, L. W., Lant, T., McDougall, P. P., Morse, E. A. and Smith, J. B. (2002). 'Toward a theory of entrepreneurial cognition: rethinking the people side of entrepreneurship research'. *Entrepreneurship Theory and Practice*, **27**, 93–104.
- Morsella, E., Bargh, J. A. and Gollwitzer, P. M. (Eds) (2008). *Oxford Handbook of Human Action*. Oxford: Oxford University Press.
- Neisser, U. (1967). *Cognitive Psychology*. New York: Appleton-Century-Crofts.
- Neuendorf, K. A. (2002). *The Content Analysis Guidebook*. Thousand Oaks, CA: Sage.
- Newell, A. and Simon, H. A. (1956). 'The logic theory machine – a complex information processing system'. *IRE Transactions on Information Theory*, **2**, 61–79.
- North, D. (2005). *Understanding the Process of Economic Change*. Princeton, NJ: Princeton University Press.
- Oliver, A. L. and Montgomery, K. (2008). 'Using field-configuring events for sense-making: a cognitive network approach'. *Journal of Management Studies*, **45**, 1147–67.
- Ozgen, E. and Baron, R. A. (2007). 'Social sources of information in opportunity recognition: effects of mentors, industry networks, and professional forums'. *Journal of Business Venturing*, **22**, 174–92.
- Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods*. Newbury Park, CA: Sage.
- Porac, J. F., Thomas, H. and Baden-Fuller, C. (1989). 'Competitive groups as cognitive communities: the case of Scottish knitwear manufacturers'. *Journal of Management Studies*, **26**, 397–416.
- Reger, R. K. and Huff, A. S. (1993). 'Strategic groups: a cognitive perspective'. *Strategic Management Journal*, **14**, 103–12.
- Rouleau, L. (2005). 'Micro-practices of strategic sensemaking and sensegiving: how middle managers interpret and sell change every day'. *Journal of Management Studies*, **42**, 1413–41.
- Rupert, R. D. (2009). *Cognitive Systems and the Extended Mind*. Oxford: Oxford University Press.
- Russell, R. D. (1999). 'Developing a process model of intrapreneurial systems: a cognitive mapping approach'. *Entrepreneurship Theory and Practice*, **23**, 65–84.
- Sarasvathy, S. D. (2001). 'Causation and effectuation: toward a theoretical shift from economic inevitability to entrepreneurial contingency'. *Academy of Management Review*, **26**, 243–63.
- Sarasvathy, S. D. (2004). 'Making it happen: beyond theories of the firm to theories of firm design'. *Entrepreneurship Theory and Practice*, **28**, 519–31.
- Sarasvathy, S. D. (2008). *Effectuation: Elements of Entrepreneurial Expertise*. Cheltenham: Edward Elgar.

- Sarasvathy, S. D. and Dew, N. (2005). 'New market creation through transformation'. *Journal of Evolutionary Economics*, **15**, 1432–86.
- Shackle, G. L. S. (1979). *Imagination and the Nature of Choice*. Edinburgh: Edinburgh University Press.
- Shane, S. A. (2000). 'Prior knowledge and the discovery of entrepreneurial opportunities'. *Organization Science*, **11**, 448–69.
- Shaver, K. G. and Scott, L. R. (1991). 'Person, process, choice: the psychology of new venture creation'. *Entrepreneurship Theory and Practice*, **16**, 23–45.
- Shepherd, D. A. and DeTienne, D. R. (2005). 'Prior knowledge, potential financial reward, and opportunity identification'. *Entrepreneurship Theory and Practice*, **29**, 91–112.
- Shepherd, D. A. and Krueger, N. F. J. (2002). 'An intentions-based model of entrepreneurial teams' social cognition'. *Entrepreneurship Theory and Practice*, **27**, 167–86.
- Shepherd, D. A. and Zacharakis, A. (2003). 'A new venture's cognitive legitimacy: an assessment by customers'. *Journal of Small Business Management*, **41**, 148–67.
- Shepherd, D. A., McMullen, J. S. and Jennings, P. D. (2007). 'The formation of opportunity beliefs: overcoming ignorance and reducing doubt'. *Strategic Entrepreneurship Journal*, **1**, 75–95.
- Shook, C. L., Priem, R. L. and McGee, J. E. (2003). 'Venture creation and the enterprising individual: a review and synthesis'. *Journal of Management*, **29**, 379–99.
- Simon, M. and Houghton, S. M. (2002). 'The relationship among biases, misperceptions and introducing pioneering products: examining differences in venture decision contexts'. *Entrepreneurship Theory and Practice*, **27**, 105–24.
- Simon, M., Houghton, S. M. and Aquino, K. (2000). 'Cognitive biases, risk perception, and venture formation: how individuals decide to start companies'. *Journal of Business Venturing*, **15**, 113–34.
- Simsek, Z., Lubatkin, M. H. and Floyd, S. W. (2003). 'Inter-firm networks and entrepreneurial behavior: a structural embeddedness perspective'. *Journal of Management*, **29**, 427–42.
- Smith, E. R. (2000). 'Social cognition'. In Kadzin, A. E. (Ed.), *Encyclopedia of Psychology*. Oxford: Oxford University Press, 324–9.
- Sternberg, R. J. and Ben-Zeev, T. (2001). *Complex Cognition: The Psychology of Human Thought*. Oxford: Oxford University Press.
- Stubbart, C. I. (1989). 'Managerial cognition: a missing link in strategic management research'. *Journal of Management Studies*, **26**, 325–47.
- Taylor, C. (1985). *Philosophical Papers, Vol. 1: Human Agency and Language*. Cambridge, MA: Cambridge University Press.
- Thagard, P. (2005). *Mind: Introduction to Cognitive Science*. Cambridge, MA: MIT Press.
- Turner, M. (2001). *Cognitive Dimensions of Social Science*. Oxford: Oxford University Press.
- Ucbasaran, D., Alsos, G., Westhead, P. and Wright, M. (2008). 'Habitual entrepreneurs'. *Foundations and Trends in Entrepreneurship Research*, **4**, 1–93.
- Ucbasaran, D., Westhead, P., Wright, M. and Flores, M. (in press). 'The nature of entrepreneurial experience, business failure and comparative optimism'. *Journal of Business Venturing*.
- Walsh, J. P. (1995). 'Managerial and organizational cognition: notes from a trip down memory lane'. *Organization Science*, **6**, 280–321.
- Weick, K. E. (1995). *Sensemaking in Organizations*. Thousand Oaks, CA: Sage.
- Weick, K. E., Sutcliffe, K. M. and Obstfeld, D. (2005). 'Organizing and the process of sensemaking'. *Organization Science*, **16**, 409–21.
- West, G. P. III (2007). 'Collective cognition: when entrepreneurial teams, not individuals, make decisions'. *Entrepreneurship Theory and Practice*, **31**, 77–102.
- Witt, U. (1998). 'Imagination and leadership – the neglected dimension of an evolutionary theory of the firm'. *Journal of Economic Behavior and Organization*, **35**, 161–77.
- Witt, U. (2000). 'Changing cognitive frames – changing organizational forms: an entrepreneurial theory of organizational development'. *Industrial and Corporate Change*, **9**, 733–55.
- Wright, M., Hoskisson, R. E., Busenitz, L. W. and Dial, J. (2000). 'Entrepreneurial growth through privatization'. *Academy of Management Review*, **25**, 591–601.