Chapter 6
Entrepreneurial Scripts and Entrepreneurial Expertise: The Information Processing Perspective

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Abstract Entrepreneurial scripts that represent entrepreneurial expertise enable researchers to begin to map the entrepreneurial mind. This chapter provides a complete demonstration of the steps needed by researchers to uncover the structure and content of the expert script knowledge structures that entrepreneurs utilize and to relate the use of these scripts to substantive organizational and entrepreneurial consequences.

6.1 Introduction

What is Mind?
No matter.
What is matter?
Never mind.[1]

Q: Is this passage believable?

A: In the case of entrepreneurship, the relationship between mind and matter is never more evident than in the new combination/creative destruction process (Shumpeter, 1934) invoked by entrepreneurs. But remarkably, until the role of the entrepreneurial mind was explicitly considered in individual entrepreneur-focused research, the connection between mind and matter – entrepreneur and new venture performance – remained elusive.

About 15 years ago (1994), a new narrative began in the search for the "E" in new venture formation entrepreneurship, with the suggestion that entrepreneurship be studied as a form of expertise (Mitchell, 1994; Dew et al., 2009). Previously, until Herron (1990) demonstrated that entrepreneurial skill and skill propensity

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[1]The above passage is a reordering and repunctuation of a quotation by Albert Baez (1967) used by Tom Stonier in the Prologue to his book *Information and the internal structure of the universe*, 1990: Springer-Verlag: London.

are related to venture performance, the persistent attempts of researchers to link the entrepreneur himself/herself to performance (Cooper et al., 1986; Kunkel, 1991; MacMillan and Day, 1987; McDougall, 1987; Sandberg, 1986) met with little success. At that time, it was industry structure and venture strategy that weighed most heavily in this calculus (e.g., Sandberg, 1986). Now, in this newly forming narrative, the focus is turning to the expert scripts of entrepreneurs to distinguish entrepreneurial experts from novices (e.g., Mitchell and Chesteen, 1995; Gustafsson, 2004), entrepreneurs across cultures (e.g., Mitchell and Seawright, 1995; Mitchell et al., 2000, 2002), and common entrepreneurial cognitions across levels of analysis (Smith et al., 2009). In fact, Dew et al. (2009: 4) suggest that what makes the scientific study of entrepreneurial expertise interesting is the commonality underlying cognitive processes that support expertise across domains (e.g., Glaser, 1984) while each individual domain – such as entrepreneurship – exhibits a rather narrow set of entrepreneurial cognition principles that are typically very specific and are therefore highly useful in developing expertise through teaching entrepreneurship-specific problem-solving and decision-making techniques (e.g., Mitchell, 2003, 2005). The common thread is human information processing.

One of the important ideas that the information processing perspective has contributed to the study of the problem-solving and decision-making techniques used in management is the concept of a script: a knowledge structure or schema (Lord and Maher, 1991a; Walsh, 1995), which refers to organized knowledge about an information environment that gives meaning to concepts or stimuli (Fiske and Taylor, 1984). Research interest in the mental templates that guide top-down information processing (Abelson and Black, 1986) has been generated in part because of the possibility that the exceptional schema-based performance of experts (Ericsson et al., 1993; Glaser, 1984) – that has been demonstrated in a variety of fields such as chess (Chase and Simon, 1973b), computer programming (McKeithen et al., 1981), law enforcement (Lurigio and Carroll, 1985), and physics (Chi et al., 1982) – might be harnessed and effectively operationalized within the field of management. However, until recently, research results in the study of managerial and organizational cognition have been fragmented (Walsh, 1995) and have been limited to particular substantive (content) areas (Lord and Maher, 1991a). Further, no general approach has yet been suggested that provides an example of how to systematically examine management-domain specialties such as entrepreneurship, to articulate their knowledge structure, and then to utilize such structures in their further study.

In a recapitulation of the information processing perspective in management research, Walsh (1995) urges scholars in the field to (1) uncover the content and structure of particular knowledge structures that managers might use and (2) " ... relate the use of this knowledge structure to consequences of substantive organizational importance ... " (Walsh, 1995, 282). In this chapter, consistent with this call and using the past 15 years as a guide, we illustrate the knowledge structures of individuals who specialize in new venture formation – the "E" in new venture formation entrepreneurship.

This chapter addresses both aspects of Walsh's (1995) call to first illuminate and then to operationalize knowledge structure research in a substantive area. To accomplish this we must tell the information processing story: to explain how the concepts have developed and lay out the key definitions, as we do in the first section. In the second section of the chapter we take on Task #1: to describe and demonstrate the steps needed to uncover (illuminate) entrepreneurial expert scripts (the structure and content of the knowledge structure used by individual entrepreneurs). Then, in the third section of the chapter, we take on Task #2: and relate the use of this knowledge structure to substantive consequences by describing a prototypical approach for identifying the script-based components of new venture formation expertise and for distinguishing entrepreneurial expertise in individuals (e.g., experts from novices) that has now become somewhat well established in the literature and suggest a template for future research. We conclude in the fourth section, by looking toward the future of entrepreneurial scripts-based research as set within the context of researching the entrepreneurial mind.

6.2 Concepts and Definitions

Information processing theory attempts to explain how information is acquired, stored, and retrieved from the memory of individuals (Neisser, 1967). In its short history, the study of human information processing has developed through three somewhat overlapping phases, each one leading ever closer to enabling the study of the entrepreneurial mind. Table 6.1 presents a chronology of key research that has led to the current capability of researchers to use information processing theory (Table 6.1, Section 1), expert information processing theory (Table 6.1, Section 2), and the notion of expert scripts (Table 6.1, Section 3) as one important means by which the entrepreneurial mind can be investigated.

As illustrated in Section 1 of Table 6.1, information processing theory has its roots in the idea that information is a function of human action and that human action can differ vis-à-vis the processes that result in information – that is, information processing. Of particular importance in this phase of research is the (fitting) recognition that there are systematic elements to the processes/processing of information. This results in the development of models that can explain these differences. Lord and Maher (1990) highlight four of these general models each of which provide implicit frameworks for research: rational, limited capacity, expert, and cybernetic. While they note that no single framework is superior, each approach possesses a unique capacity to explain elements of information processing for specific situations and purposes. Of particular interest to management scholars is the expert model because of its potential for explaining dramatic individual-based performance differences between the group with expertise and the group without.

According to expert information processing theory, experts store and retrieve information from long-term memory differently than do novices. Experts utilize

Table 6.1 Information processing, expert information processing, and expert scripts – a selected chronology

Year	Author(s)	Excerpt	Application to this chapter narrative
		Section 1: INFORMATION PROCESSING THEORY	
1937	von Hayek, FA	…before we can explain why people commit mistakes, we must first explain why they should ever be right (1937, 34); Two concepts of data (that explain this) are really fundamentally different and ought to be kept carefully apart…(1) that the subjective data possessed by individuals are mutually compatible; and (2) whether the individual subjective sets of data correspond to the objective data (1937, 39–40)	Knowledge depends on explanations that render data into information
1956	Miller, GA	(Consists of)…experiments in absolute judgment:…experiments on the capacity of people to transmit information…(and) would not have been done without the appearance of information theory (1956, 81)	Such an exercise of human judgment requires a theory of information
1972	Newell, A; Simon, HA	…states the theory [information processing theory] in comprehensive form (1972, 14)	The notion that humans "process" information provides a theoretical foundation for future work
1977	Shiffrin, RM; Schneider, W	A general framework for human information processing is proposed; the framework emphasizes the roles of automatic and controlled processing (1977, 127)	Types of processing are then explored, e.g., automatic and controlled
1979	Lachman, R; Lachman, J; Butterfield, EC	An analogy to computers explains the operation of the information-processing system as a whole. In this analogy, information processing is guided by preexisting routines which are similar to computer programs. These routines are stored in long-term memory, but their execution involves short-term memory or attentional capacity (from Lord and Mayer, 1990)	Processing considerations lead to the rise of the computer metaphor to describe human information processing
1986	Bourne, LE; Dominowski, RL; Loftus, EF; Healy, AF	Cognitive psychologists face the enormous task of explaining phenomena…in systematic, scientific terms. The approach that seems to show the most promise of providing an explanation is based on the notion that human beings are systems for processing information (1986, 11–12)	The computer metaphor further develops; and humans are conceptualized as information processing systems

Table 6.1 (continued)

Year	Author(s)	Excerpt	Application to this chapter narrative
1990	Lord, RG; Maher, KJ	A general taxonomic system of alternative information-processing models (rational, limited capacity, expert, and cybernetic) found in the management and psychological literatures is developed (1990, 9)	Several types of information processing models develop and are summarized for relevance to the management literature
1995	Walsh, JP	A host of research challenges are identified to help develop a better understanding of knowledge structure representation, development, and use in organizations (1995, 280)	Information processing in organizations presents research challenges
1997	Hinsz, VB; Tindale, RS; Vollrath, DA	A selective review of research highlights the emerging view of groups as information processors . . . . A combination of contributions framework provides an additional conceptualization of information processing in groups (1997, 43)	A natural extension of individual information processing to organizations suggests a group level of analysis
1998	Schwarz, N	Since the late 1970s, theorizing in psychological social psychology has been dominated by the computer metaphor of information processing models, which fostered an emphasis on "cold" cognition and the conceptualization of individuals as isolated information processors. . . . The emerging picture is compatible with social psychology's latest metaphor, humans as motivated tacticians who pragmatically adapt their reasoning strategies to the requirements at hand (1998, 239)	As the study of humans within organization develops, the field migrates away from the computer metaphor of information processing toward a notion of humans as motivated tacticians with pragmatically adaptive reasoning

Section 2: EXPERT INFORMATION PROCESSING THEORY

Year	Author(s)	Excerpt	Application to this chapter narrative
1946 (1965)	De Groot, AD	Investigated the cognitive requirements and the thought processes involved in moving a chess piece. . . (and suggested) that visual memory and visual perception are important attributors and that problem-solving ability is of paramount importance	An initial linkage is suggested between expert task performance (e.g., in chess) and visual memory and visual perception
1973	Simon, HA; Chase, WG	. . . proposed the first general theory of expertise, and it was based on the human-information processing theory (Newell and Simon, 1972), which assumes that normal, healthy human adults do not differ in terms of basic short-term memory capacity and other fundamental characteristics of elementary cognitive processes (from Ericsson, 2005, 234)	The idea develops that experts are different cognitively: specifically in terms of information processing

Table 6.1 (continued)

Year	Author(s)	Excerpt	Application to this chapter narrative
1973	Chase, WG; Simon, HA	Chase and Simon (1973a, b) extended de Groot's (1946) original findings and demonstrated a new paradigm for studying the complex memory representations of experts (from Ericsson, 2005, 235)	A new way to study the complex memory of experts is proposed
1973	Chase, WG; Simon, HA	This paper develops a technique for isolating and studying the perceptual structures that chess players perceive (1973a, 55)	Puts forward techniques that might be useful for studying expert perceptions
1981	Chase, WG; Ericsson, KA	... skilled memory is the rapid and efficient utilization of memory in some knowledge domain to perform a task at an expert level ... (herein) we present our analysis of the cognitive processes underlying this memory feat, and we want to use this specific example to develop what we think are the important theoretical principles that we have discovered about skilled memory (1981, 141)	Introduces the idea that skilled memory might explain expert performance
1982	Chase, WG; Ericsson, KA	A theory of skilled memory is proposed in which the size of working memory expands as skill increases (1982, 1)	Elaborates the idea of skilled memory as an expansion of expert working memory
1983	Fiske, ST; Kinder, DR; Larter, WM	... for experts, but not for novices, knowledge-based inferences were mediated by their clustering of recall . ... Expert/novice differences in the use of shared knowledge content encourages more focus on individual differences in strategies for the use of prior knowledge in social cognition (1983, 381)	Proposes the idea (that is later dominant in the literature) that expertise involves both a knowledge base and problem-solving processes
1992	Day, DV; Lord, RG	... to understand more fully the role of managerial cognition in organizations. As such, we (found that) ... experts rely on well-developed, context-dependent Entrepreneurial cognitions in the early stages of their decision making. It is argued that such Entrepreneurial cognitions allow organizational experts to make sense of strategic issues .... (1992, 35)	Begins to suggest the application of expert entrepreneurial cognitions to organizations
1993	Ericsson, KA; Krampe, RT; Tesch-Romer, C	... explains expert performance as the end result of individuals' prolonged efforts to improve performance .... Individual differences, even among elite performers, are closely related to assessed amounts of deliberate practice. Many characteristics once believed to reflect innate talent are actually the result of intense practice extended for a minimum of 10 years (1993, 363)	Introduces the notion of deliberate practice as a key explanation for individual differences in expert performance

Table 6.1 (continued)

Year	Author(s)	Excerpt	Application to this chapter narrative
1994	Ericsson, KA; Charness, N	Counter to the common belief that expert performance reflects innate abilities and capacities, recent research in different domains of expertise has shown that expert performance is predominantly mediated by acquired complex skills and physiological adaptations (1994, 725)	Counters the "innate abilities" argument that has previously predominated in explanations for expert performance
1994	Mitchell, RK	Differences in new venture formation expertise are explained (where) entrepreneurship theory and expert information processing theory are combined (to result) in the following: (1) the composition of new venture formation expertise is delineated on the basis of empirical findings, (2) The classification of individual venturers into more finely discriminated categories between expert and novice is made more practical, and (3) the process of creating additional expertise in new venture formation novices is documented, better understood, and improved (1994, 5)	Suggests that expert scripts might explain new venture formation (entrepreneurship)
1995	Ericsson, KA; Kintsch, W	In the proposed theoretical framework cognitive processes are viewed as a sequence of stable states representing end products of processing. In skilled activities, acquired memory skills allow these end products to be stored in long term memory and kept directly accessible by means of retrieval cues in short-term memory, as proposed by skilled memory theory. These theoretical claims are supported by a review of evidence on memory in text comprehension and expert performance in such domains as mental calculation, medical diagnosis, and chess (1995, 211)	Begins to explain how expertise works (e.g., underlying processes, etc.)
1996	Mitchell, RK	Under the principles of information processing theory, expert scripts explain the remarkable performance differences between otherwise "mystical" experts, and novices. Where script content is traced from entrepreneurial oral histories to shared interpretations, insider knowledge is demystified, and practical, understandable insights about how insider-entrepreneurs think are obtained. In this way management history serves the cause of management science (1996, 51)	Provides qualitative evidence and theory to support expert information processing explanations for entrepreneurship

Table 6.1 (continued)

Year	Author(s)	Excerpt	Application to this chapter narrative
1998	Gobet, F; Simon, HA	. . . this paper re-examines experimentally the finding of Chase and Simon (1973a) that the differences in ability of chess players at different skill levels to copy and to recall positions are attributable to the experts' storage of thousands of chunks . . . (Results) are highly correlated with those of Chase and Simon. We conclude that the two-second inter-chunk interval used to define chunk boundaries is robust, and that chunks have psychological reality (1998, 225)	Links the concept of chunking to expert script explanations
1998	Sarasvathy, DK; Simon, HA; Lave, L	We compared entrepreneurs with bankers in their perception and management of a variety of risks. Problems included financial risk, risk to human life and health, and risk of a natural disaster. Cluster analysis and content analysis of think-aloud protocols revealed surprising details. Entrepreneurs accept risk as given and focus on controlling the outcomes at any given level of risk; they also frame their problem spaces with personal values and assume greater personal responsibility for the outcomes. Bankers focus on target outcomes – attempting to control risk within structured problem spaces and avoiding situations where they risk higher levels of personal responsibility (1998, 207)	Suggests an expertise-based explanation for traditionally trait-based explanations for entrepreneurship (e.g., risk taking)
1999	Kintsch, W; Patel, VL; Ericsson, KA	A distinction is made between short-term working memory, which is capacity limited, and long-term working memory, which is available to experts in their domain of expertise (1999, 186)	Links work and long-term memory to domain expertise
2003	Ericsson, KA	Discussed here are the implications for broad attainability of highly skilled memory performance in professional and everyday activities (2003, 233)	Refines memory-based explanations for expertise in the professions
2003	Mitchell, RK	Performance comes from cognitions created through deliberate practice (Ericsson et al. 1993), which depends upon individuals' endowments (Ericsson and Charness, 1994; Gardner, 1983; Gardner, 1993) (2003, 195)	Suggests deliberate practice to be a key factor in individual-based explanations for entrepreneurship

Table 6.1 (continued)

Year	Author(s)	Excerpt	Application to this chapter narrative
2004	Ericsson, KA; Delaney, PF; Weaver, G; Mahadevan, R	Our paper describes a general experimental approach for studying the structure of exceptional memory (2004, 191)	Delves deeply into the mechanisms used in exceptional memory feats, specifically in the information encoding process
2005	Ericsson, KA	. . . a new trend (is emerging) towards capturing the expert performance with representative tasks in the laboratory and focus on how this superior performance is acquired through training and extended deliberate practice (2005, 233)	Suggests how the study of expert performance can benefit from laboratory studies of deliberate practice
2005	Mitchell, RK	The . . . implication of the findings in Mitchell and Chesteen (1995) is to establish links among deliberate practice, script enhancement, and transaction cognition theory. The link between deliberate practice and script/ expertise enhancement is established through confirmation of the relationship between certain deliberate practice activities – in this case direct contact with individuals who are more expert, which students analyzed metacognitively (by being required to "think about their thinking") – and changes in the subjects' cognitive scripts . . . . There exist both empirical evidence and evidence from educational practice, which suggest that (the deliberate practice model) may in fact, be generalizable to the education of global entrepreneurs (2005, 190, 206)	Refines the educational implications for the deliberate-practice-based education of entrepreneurs in a general (global) setting
2009	Dew, N; Read, S; Sarasvathy, SD; Wiltbank, R	In support of theory, this study demonstrates that entrepreneurial experts frame decisions using an "effectual" logic (identify more potential markets, focus more on building the venture as a whole, pay less attention to predictive information, worry more about making do with resources on hand to invest only what they could afford to lose, and emphasize stitching together networks of partnerships); while novice use a "predictive frame" and tend to "go by the textbook" (2008, 1)	Begins the further exploration of how expert information processing translates to the actual processes whereby entrepreneurs select and enact decisions

Table 6.1 (continued)

Year	Author(s)	Excerpt	Application to this chapter narrative
		Section 3: SCRIPTS/ KNOWLEDGE STRUCTURES	
1976 1977	Abelson, RP Schank, RC; Abelson, RP	Script processing in attitude formation and decision making Sometimes having recourse to knowledge of a standard sequence of events, the reasons for which we have already determined to our satisfaction, is useful in the understanding process. When a waitress comes to our table with food in a restaurant it is not necessary to figure out what caused her to arrive. It is sufficient to have knowledge of the causal sequence of events in restaurants to allow us to behave appropriately. This knowledge leaves more cognitive capacity available for use in more interesting tasks. It also allows a certain amount of ellipsis in textual accounts of situations that have a commonly recognized sequence of events. These standard sequences of events have been termed scripts (Schank and Abelson, 1977, as cited in Abbott and Black, 1986, 130)	Relates scripts and decision making Develops further the idea that understood task sequence helps to explain expertise due to added cognitive capacity
1982	Glaser, R	. . . experts store and retrieve information from long-term memory differently than novices do (1982, 292)	Begins to explore expert–novice distinctions in terms of information retrieval
1984	Glaser, R	The interaction between the development of problem-solving and learning skills and the acquisition of structures of domain-specific knowledge is discussed. Suggestions are made for developing thinking abilities in the context of the acquisition of knowledge and skill (1984, 93)	Provides a foundation for both distinguishing experts and novices, and also for explaining the learning processes leading to expertise
1986	Leddo, J; Abelson, RP	. . . the hierarchical, goal–subgoal organization of scripts permits individuals to make attributions that depend upon how events proceed sequentially . . . the opportunity to distinguish novices from experts occurs at two key points in expertise-specific situations, when the performance of an expert script (an attempt to utilize expertise) might fail . . . these points occur either: (1) at the time of script "entry," or (2) as individuals engage in "doing" the things that serve the main goal of a script . . . script "entry" depends upon " . . . having the objects in question" . . . "doing" depends upon two subrequirements: ability and willingness (1986, 121)	Suggests a general sequential structure useful to the study of professional expertise that leads to the higher-level constructs that appear in new venture formation expertise: arrangements, willingness, and ability

Table 6.1 (continued)

Year	Author(s)	Excerpt	Application to this chapter narrative
1987	Lord, RG; Kernan, MC	This paper focuses on the role cognitive scripts, a unique type of knowledge schema, play in generating purposive behaviors in organizations (1987, 265)	Links scripts to organization
1987	Read, SJ	A model of causal reasoning based on Schank and Abelson's (1977) analysis of knowledge structures is presented. The first part of this article outlines the necessary characteristics of such a model . . .. The second part of this article analyzes how the knowledge structures outlined by Schank and Abelson (1977) – scripts, plans, goals, and themes – can be used to construct such causal scenarios, and it presents a process model for the construction of such scenarios (1987, 288)	Suggests the nature of the causal scenarios that provide a basis for the measurement and analysis of expert scripts
1987	Olson, JR; Rueter, HH	. . . methods developed by cognitive science to reveal human knowledge structures . . . are (in) two classes of investigative methods, direct and indirect (1987, 152)	Provides a foundation for the script-cue measurement method
1988	Glaser, R	Experts efficiently translate problem information in a situation into problem solutions (1988, 269)	Suggests how cueing might enable the classification of experts from novices
1995	Mitchell, RK; Chesteen, SA	In this paper we link entrepreneurial expertise with the notion of an expert "script" as a means for enhancing entrepreneurial expertise. The focus of this paper is an instructional pedagogy that improves students' entrepreneurial expertise through the application of the recommendations of expert information theorists regarding script acquisition. Expert information theory suggests contact with expert scripts as a primary means for acquiring expertise. Concepts from the simulation and gaming literature are employed to design the pedagogy which features such contact as its primary emphasis (1995, 288)	Applies current expert information processing theory to suggest a way to enhance new venture formation expertise and to measure the results using script cues
1999	Glass, RS; Oz, E	This study uses verbal protocol analysis to identify and compare the information cues used by experts and novices (while) performing software diagnosis tasks (1999, 40)	Describes how protocol analysis can also be used to assess expert information cueing

Table 6.1 (continued)

Year	Author(s)	Excerpt	Application to this chapter narrative
2000	Woloschuk, W; Harasym, P; Mandin, H; Jones, A	This study sought to determine the extent to which faculty and students were implementing and utilizing scheme-based problem solving . . . the benefits of schemes for problem solving was also evident (2000, 437)	Further develops the problem-solving element of deliberate practice
2000	Mitchell, RK; Smith, JB; Seawright, KK; Morse, EA	Arrangements, willingness, and ability scripts are found to be associated with the venture creation decision, while some two-way interaction effects involving arrangements scripts were also significant. Cultural values of individualism and power-distance are found to be associated with willingness and ability cognitive scripts, and to also to be associated with the venture creation decision through interaction with arrangements scripts. These results support and extend theory, and provide preliminary evidence of consistency in cognitive scripts across cultures (2000, 974)	Applies expert information processing theory and script-cue recognition methods to test a model of cross-cultural entrepreneurship
2001	Day, EA; Arthur, W; Gettman, D	The purpose of this study was to examine the viability of knowledge structures as an operationalization of learning in the context of a task that required a high degree of skill (2001, 1022)	Applies scripts/ knowledge structures to the learning in a high-skill task domain
2002	Mitchell, RK; Smith, JB; Morse, EA; Seawright, KW; Peredo, AM; McKenzie, B	In this study we examine three research questions concerned with entrepreneurial cognition and culture: (1) Do entrepreneurs have cognitions distinct from those of other business people? (2) To what extent are entrepreneurial cognitions universal? (3) To what extent do entrepreneurial cognitions differ by national culture? . . . using data collected in a field setting that included 990 respondents in eleven countries. We find . . . that individuals who possess "professional entrepreneurial cognitions" do indeed have cognitions that are distinct from business non-entrepreneurs . . . further confirmation of a universal culture of entrepreneurship . . . and in answer to question three, we find (a) observed differences on eight of the ten proposed cognition constructs, and (b) that the pattern of country representation within an empirically-developed set of entrepreneurial archetypes does indeed differ among countries. Our results suggest increasing credibility for the cognitive explanation of entrepreneurship in the cross-cultural setting (2002, 9)	Applies scripts/ knowledge structures to differentiating entrepreneurs from nonentrepreneurs and to establishing the extent to which entrepreneurial cognition is more universal across cultures. On the basis of scripts, a set of entrepreneurial cognitive archetypes is developed

Table 6.1 (continued)

Year	Author(s)	Excerpt	Application to this chapter narrative
2003	Davis, MA; Curtis, MB; Tschetter, JD	… a key factor in differentiating expert and novice performance is the way individuals organize their knowledge … measures of structural knowledge quality predicted individual differences in performance self-efficacy (2003, 322)	Further explores expert knowledge organization
2004	Zohar, D; Luria, G	… script orientation … predicted climate level, whereas script simplicity and cross-situational variability predicted climate strength (2004, 322)	Applies script-based observation to explain other organizational features: e.g., climate
2005	Jones, DK; Read, SJ	Experts relied more on events; used a more historical analysis consisting of past states, events, goals, and actions; and, most important, relied heavily on causal reasoning to create a coherent, understandable causal scenario or narrative. In addition, experts' overall explanation networks were significantly more connected (but less centralized) than those of the other groups (2005, 45)	Suggests how expertise – as a social phenomenon (e.g., networks) – might operate in general
2006	Bradley, JH; Paul, R; Seeman, E	… experience alone is not an indicator of expertise. Other factors, such as the cognitive ability to correctly structure those experiences, must also be present (2006, 77)	Reaffirms that expertise and experience are not synonymous
2007	Corbett, AC; Hmieleski, KM	In this article, we examine the interplay and divergence between the role schema of individuals in corporations and the event schemas necessary to launch a new venture. By examining these schemas together, we show how the corporate context can create tension between corporate entrepreneurs' role schemas and the event schemas necessary for entrepreneurship (2007, 103)	Further dimensionalizes the expert/ novice analysis repertoire by differentiating between corporate and independent entrepreneurship
2007	Corbett, AC; Neck, HM; DeTienne, DR	… we advance the literature on entrepreneurial human capital by linking cognitive scripts used by corporate entrepreneurs in project termination decisions to corresponding levels of learning (2007, 829)	Applies entrepreneurial scripts in the corporate entrepreneurship setting

Table 6.1 (continued)

Year	Author(s)	Excerpt	Application to this chapter narrative
2009	Dew, N; Read, S; Sarasvathy, SD; Wiltbank, R	In support of theory, this study demonstrates that entrepreneurial experts frame decisions using an "effectual" logic (identify more potential markets, focus more on building the venture as a whole, pay less attention to predictive information, worry more about making do with resources on hand to invest only what they could afford to lose, and emphasize stitching together networks of partnerships); while novice use a "predictive frame" and tend to "go by the textbook" (2008, 1)	Again, further dimensionalizes the nature of entrepreneurial expertise by demonstrating differences in the underlying logics (e.g., framing) between experts and novices
2008	Kabanoff, B; Brown, S	We explore the content and structure of top managers' strategic knowledge structures by measuring differences in the level of attention they give in annual reports to strategic issues and themes that Miles and Snow used to describe their main strategic types (2008, 149)	Addresses the need to further uncover the content of various expert scripts (e.g., Walsh, 1995)
2008	Seawright, KW; Mitchell, RK; Smith, JB	This research examines cognitive similarities and differences among Russian and U.S. entrepreneurs and nonentrepreneurs. Manova and multiple discriminant analysis results found similarities between U.S. and Russian experts and U.S. and Russian novices with respect to Arrangements, Willingness, and Ability scripts, but differences in these scripts were found between experts and novices, particularly in Russia (2008, 1)	Applies entrepreneurial script explanations to analyze the unexpectedly low entrepreneurship levels in a newly forming market economy
2008	Sarasvathy, S	Suggests how entrepreneurs use logic and insight used to convert problems into opportunities. Effectuation empirics are observations of 27 entrepreneurs which revealed how each individual converted "as if" circumstances into "even if" ones. Cognition of these entrepreneurs compared to MBA students showed stark differences between the ways the two groups approached problem solving. MBA's largely used "causal logic" – starting with a specific goal or desired effect and working towards that end. In contrast, the entrepreneurs used "effectual logic," beginning with themselves and being creative with the resources they had to work with	Provides fine-grained analysis and characterization of entrepreneurial thinking processes as distinct from those of novices

Table 6.1 (continued)

Year	Author(s)	Excerpt	Application to this chapter narrative
2008	Mitchell, RK; Mitchell, JR; Smith, JB	In this article, we: (1) elaborate on the critical dimensions that represent a multi-construct view of the new transaction commitment mindset and describe ways that these dimensions can be measured; (2) examine the extent to which the recognition of new venture failure impacts the new transaction commitment mindset; and (3) explore the implications of the interaction between failure recognition and the new transaction commitment mindset for an entrepreneur's decision to continue or abandon opportunity creation efforts (2008, 1)	Begins the more fine-grained exploration of entrepreneurial mindsets by assessing the impact of recognizing failure on the opportunity creation process
2009	Smith, JB; Mitchell, JR; Mitchell, RK	… this paper: (1) clarifies the nature of the relationship between entrepreneurial expert scripts and constructs that might represent an entrepreneurial mindset at the individual level of analysis, (2) identifies analogous relationships at the economy level of analysis where the structure found at the individual level informs an economy-level problem, (3) presents a NAFTA-based illustration analysis to demonstrate the extent to which cognitive findings at the individual level can be used to explain economy-level phenomena, and (4) extrapolates from our analysis some of the ways in which script-based comparisons across country or culture can inform the more general task of making information processing-based comparisons among entrepreneurs across other contexts	Elaborates the usefulness of scripts to enable explanations of how individual-level phenomena (e.g., entrepreneurial scripts) impact economy-level outcomes (e.g., NAFTA trade-issue resolution). Suggests an approach to burgeoning interest in cross-level entrepreneurial cognition research

highly developed knowledge systems based in long-term memory to establish and maintain exceptional capabilities in specialty areas (Lord and Maher, 1990). These knowledge systems are organized around context-relevant scripts (Read, 1987). The main assertion of the expert information processing model is that experts outperform novices within their area of expertise because they can recognize immediately that which novices require great effort to discover – compliance of expertise-specific circumstances with an expert script. The cornerstone literature upon which expert information processing theory concepts are based are presented in Section 2 of Table 6.1. A critical contribution of expert information processing research that is evident in this section is its usefulness in elucidating the latent structure of superior performance. By so doing, it provides a pathway for improving performance. This explanation stands in opposition to previous research that deterministically viewed superior performance as being based in innate abilities and traits. In this way, expert information processing research is fundamental to entrepreneurship research. Interestingly, it is one element of expert information processing theory that has become highly useful in the investigation of the entrepreneurial mind: the notion of expert scripts.

The term " expert script" refers to highly developed, sequentially ordered knowledge in a specific field (Glaser, 1984; Leddo and Abelson, 1986; Lord and Maher, 1990; Read, 1987). Scripts are defined as commonly recognized sequences of events that permit rapid comprehension of expertise-specific information by experts (Schank and Abelson, 1977), as cited in Abbott and Black, 1986. An expert script is most often acquired through extensive real-world experience, and it dramatically improves the information processing capability of an individual (Glaser, 1984), although not without the danger of promoting thinking errors such as stereotypic thinking, the inhibition of creative problem solving, and the discouragement of disconfirmation of the script in the face of discrepant information (Walsh, 1995). Expert information processing theory generally treats the terms knowledge structure and expert script as synonymous.

The cornerstone literature upon which expert script concepts are based are presented in Section 3 of Table 6.1. The research that is highlighted in this section of the table is important to entrepreneurship because it articulates the action-based steps of experts in their decision making. This is important to the field of entrepreneurship given the central role of individual action in socioeconomic activity (Commons, 1931). Additionally, research on expert scripts/knowledge structures also provides an important link between information processing-specific research and the broader literature on entrepreneurial cognition (cf. Mitchell et al., 2007).

Based upon the foregoing conceptual chronology, we are then, in Table 6.2, able to summarize the key terms and definitions that form the foundation of this essay.

We therefore turn our attention to the next section, which describes an approach that can be used to uncover structure and content in entrepreneurial expert scripts.

Table 6.2 Key terms and definitions

Term	Definition
Ability	Possessing the rudimentary techniques and skills necessary to a specialized domain (Leddo and Abelson, 1986: 121)
Cue	Pieces of information in expertise-specific problem statements that enable experts to infer further knowledge about the situation
Cue recognition	The ability to recognize a context-relevant cue from other (distracter) information in the environment
Distracter statement	A plausible, even appealing alternative to a script cue to those who are unfamiliar with the content domain (i.e., novices)
Doing	See *script doing*
Entry	See *script entry*
Expert	An individual who shows expertise in a given domain; someone with a large knowledge based in a particular content domain (Lord and Maher, 1990)
Expert information processing theory	One of the general models of information processing theory where individuals "rely on already developed knowledge structures to supplement simplified means of processing information" (Lord and Maher, 1990: 13)
Expert script	Highly developed, sequentially ordered knowledge in a specific field (Glaser, 1984; Leddo and Abelson, 1986; Lord and Maher, 1990; Read, 1987), acquired through extensive real-world experience; synonymous with *knowledge structure*
Expertise	The ability of an individual to, with excellent performance, perform a task in a particular domain
Feasibility	Having the resources available to accomplish a task
Human information processing	The view that human beings are systems for processing information (Bourne et al., 1986)
Information processing	See *information processing theory*
Information processing perspective	See *information processing theory*
Information processing theory	A theory that views an individual as a processor of information (Newell and Simon, 1972, 5) and attempts to then explain how this information is acquired, stored, and retrieved from memory (Neisser, 1967)
Knowledge categories	Broad mental categories that, when differentiated and linked, permit experts to make sense of new knowledge (Bower and Hilgard, 1981)
Knowledge structure	Organized knowledge about an information environment that gives meaning to concepts or stimuli (Fiske and Taylor, 1984)
Norm	Standard practices that guide experts to perform correctly in their area of specialty (Leddo and Abelson, 1986: 107)
Novice	An individual who does not show expertise in a given domain. Often a beginner who does not have experience in that domain

Table 6.2 (continued)

Term	Definition
Preliminary knowledge scaffold	Temporary models that "help organize new knowledge and offer a basis for problem solving that leads to the formation of more complete and expert schemata" (Glaser, 1984, 101)
Principle of coherence	Requires the use of sufficient knowledge to produce the most intelligible interpretation (Read, 1987)
Principle of concretion	Constrains interpretation to the use of the most concrete knowledge possible (Read, 1987)
Principle of least commitment	Suggests that people make no more than the minimum assumptions necessary to produce a coherent interpretation (Read, 1987)
Principle of exhaustion	Requires that an interpretation account for all the data (Read, 1987)
Principle of parsimony	Instructs people to produce an interpretation that maximizes the connections among inputs (Read, 1987)
Schema	See *knowledge structure*
Schematize	To organize knowledge in chunks or packages so that, given a bit of appropriate situational context, an individual has available many likely inferences on what might happen next in a given situation (Abelson and Black, 1986)
Script	Commonly recognized sequences of events that permit rapid comprehension of expertise-specific information by experts (Schank and Abelson, 1977); mental representations of the causality-connected actions, props, and participants that are involved in common activities (Galambos et al., 1986: p. 19)
Script cue	See *cue*
Script-cue recognition	See *cue recognition*
Script doing	Accomplishing the main action and achieving the purpose of the script. Depends on both *ability* and *willingness*
Script entry	Concerns the availability of the objects necessary for the enactment of the script. Depends on *feasibility*
Sequence	The order that a series of events/actions is in regarding a script
Structure guidelines	Criteria that help to describe the structure of relevant scripts. The guidelines include following specific metarules of story comprehension, construction steps, and rules of causal syntax
Willingness	The propensity to act

6.3 The Structure and Content of Entrepreneurial Scripts

In this section of the chapter we (1) define the structure of expert scripts, (2) identify generalized techniques which consistently furnish the essential content of such scripts, and (3) demonstrate these techniques in the case of entrepreneurs.

6.3.1 Structure

The structure of expert scripts is described in the expert information processing theory literature by several key studies (Abelson and Black, 1986; Chi et al., 1988; Glaser, 1984; Leddo and Abelson, 1986; Read, 1987) which provide the definitions needed to clarify the nature of script structure. The definitional aspects of script structure presented in the subsections that follow move from the more general to the more specific.

6.3.1.1 Sequences and Norms

The most general element of expert script structure is based upon unique differences in the knowledge organization of experts versus novices. Glaser suggests that the knowledge of novices is topical versus contextual; i.e., it is organized around the literal objects explicitly apparent in a problem statement. Hence, limitations in the thinking of novices are due to their inability to infer further knowledge from the literal cues in expertise-specific problem statements. Conversely, experts' knowledge is organized around principles and abstractions that (1) are not apparent in problem statements, (2) subsume literal objects, and (3) derive instead from a knowledge about the application of particular subject matter, leading experts to generate relevant inferences within the context of the knowledge structure or script that they have acquired (Glaser, 1984). Thus expert scripts specify context, because (1) they have a "sequential structure" and (2) they incorporate the " norms" that guide the actions of experts in their area of specialty (Leddo and Abelson, 1986: 107). Accordingly, the first, general specification of the structure of an expert script is that it should include both sequences and norms.

6.3.1.2 Categories

Experts make sense of new situations by drawing upon previously stored knowledge (Cohen and Levinthal, 1990). Bower and Hilgard suggest that this knowledge is stored in broad categories which, when differentiated and linked, permit individuals to make sense of new knowledge (Bower and Hilgard, 1981). In the case of new venture formation, these knowledge categories might include individual attributes (IA) (Carbonnell, 1979; Chi et al., 1988), individual experiences (IE) (Abelson and Black, 1986; Glaser, 1984), individual resources (IR) (Chi et al., 1988), organizational characteristics (OC) which make the knowledge structure context-specific (Lord and Maher, 1990), and prior training (PT) (Cohen and Levinthal, 1990). By pointing to areas that are important to description at the individual level of analysis, which affect outcomes at the group (expertise) and organizational (organizational formation) level (e.g., individually possessed expertise that potentially affects expertise in new venture formation) (Krackhardt, 1990; Rousseau, 1985; Walsh, 1995), these five possible knowledge categories also assist the researcher with a mid-range "preliminary knowledge scaffold" (Glaser, 1984) that supports the later identification of substantive content.

6.3.1.3 Structure Guidelines

Expert information processing theory also contains quite specific criteria that help to describe the structure of viable scripts. The identification of specific structure criteria is important, since the criteria utilized within any script definition framework form a "template" of sorts that can then be applied to proposed depictions of scripts to test for compliance with expert information processing theory. Read provides such a model. The model applies five principles or " metarules" of story comprehension[2] (Read, 1987, 294) identified in expert information processing theory (Granger, 1980; Kay, 1982; Marr, 1977; Wilensky, 1983) that affect an individual's understanding of social interaction. The model itself consists of a six-step construction process[3] (Read, 1987). Based upon the work of Schank and Abelson (1977), Read's model employs six rules of causal syntax[4] that govern how various elements in a script can be causally linked. Although not explicitly recognized by Read, Glaser adds that scripts should be constructed such that they provide literal cues in the problem statement that trigger inference on the part of the subject, since the "... inability to infer further knowledge from the literal cues in the problem statement" is argued to be the reason for the "... problem solving difficulty of novices" (Glaser, 1984, 99). We consider Glaser's observation regarding the differential nature of cue recognition between experts and novices to be a primary tool for uncovering the structure and content of particular knowledge structures (scripts). The metarules, construction steps, and rules of causal syntax, along with the nature of the information used in script-cue development, combine to form specific script structure criteria that may be used to judge the conformance of scripts to expert information processing theory.

6.3.1.4 Structure Definition

Scripts thus consist of sequences, which identify precedence relationships in a goal–subgoal framework (Read, 1987) to which adhere the norms that define the expert expectations of each step in that sequence. Further, scripts subsume knowledge categories (five are suggested in the case of new venture formation as noted previously). Finally, scripts are structured according to at least one of three sets of structure guidelines against which they can be evaluated for compliance, provided that they are also in compliance with the inferential cueing criterion specified by Glaser.

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[2]Metarules include the principles of coherence, concretion, least commitment, exhaustion, and parsimony.

[3]Construction steps include (1) making categorizations about people and situations, (2) connecting subsequently observed actions with the initial scenario, (3) evaluating congruence between actions and the underlying plan, (4) identifying the plan's goal, (5) evaluating whether the goal is part of a larger plan or whether it is an end in itself, (6) identifying the goal's source.

[4]Rules of causal syntax include the following: (1) actions and events can result in state changes, (2) states can enable actions and events, (3) states can disable actions, (4) states can initiate mental states, (5) acts can initiate mental states, and (6) mental states can be reasons for actions.

6.3.2 Content

There appear to be two primary alternatives that might be used in the articulation of script content. The first alternative is comprehensive enumeration, that is, to attempt to "take a census" of all the content that relates to a particular domain. The second alternative is some type of sampling upon which inference respecting the "content whole" might be made. Comprehensive enumeration poses significant operational difficulty due to the idiosyncratic and dynamic nature of knowledge in the multitude of expert domains that exist. In fact, the impracticality of comprehensive enumeration may be one of the reasons that the identification of script content has been somewhat daunting to researchers, especially in the management domain. We speculate that one possible reason for the seeming impasse in the identification of script content is because of the assumption that few if any acceptable alternatives to comprehensive enumeration exist. This assumption likely has its roots in expert information processing theory, which has developed largely to support research in artificial intelligence (AI) and expert systems. In this research stream, comprehensive enumeration has been a virtual necessity, due to the requirements of the computer processing medium used to operationalize and test AI and expert systems.

However, there appears to be no such constraint within the management domain. With its roots in the social sciences, and by extension, in the use of inferential statistics as the tool for operationalization and testing, management science has deemed methods which rely upon the sampling of populations for inferential purposes to be acceptable. It is but a minor extension of this logic to suggest that, at least as a beginning point for management research into the content of expert scripts, a sampling of script content might be a practical alternative to comprehensive enumeration. Sampling has the advantage of serviceability, but presently lacks guidelines for operationalization. This chapter develops and operationalizes the sampling alternative, based on the concepts of script-cue recognition.

6.3.2.1 Cue Recognition

A fundamental assertion of expert information processing theory is that experts interpret cues in problem statements differently than do novices (Glaser, 1984). Interestingly, the reason for the dissimilarity of interpretation is traceable to differences in the way that individuals organize knowledge. Expert knowledge is "schematized," i.e., organized in chunks or packages so that, given a bit of appropriate situational context, an individual has many likely inferences available on what might happen next in a given situation (Abelson and Black, 1986). The notion of " knowledge chunks" prompts the speculation that if little bits of situational context (representations from expert scripts) were to be provided to individual experts and novices as cues, their ability to recognize the context as applicable to them individually might confirm the structure and content of an expert script, while also revealing individual levels of expertise. Further, the cue recognition approach suggests that

sampling versus full enumeration of script content should be sufficient to discriminate experts from novices.

6.3.3 New Venture Formation Content Identification

A possible approach to uncovering the structure and content of scripts, then, is for the researcher to identify a representative body of literature (in this case a representative body of new venture formation literature) and to construct script cues on the basis of that literature. Then, utilizing the guidelines within expert information processing theory which specify the criteria for script structure, these cues are examined for consistency with expert information processing theory. In this section, the script structure guidelines and content identification techniques previously described are utilized to produce "script cues." The literature review and analysis method utilized consists of six steps as follows:

1. identify examples of new venture formation-specific knowledge;
2. classify these into those that primarily deal with the *sequence* of expert actions and those that deal with the *norms* that guide those actions;
3. focus on the five suggested knowledge categories of new venture formation: (1) individual attributes (IA), (2) individual experiences (IE), (3) individual resources (IR), (4) organization characteristics (OC), and (5) prior training (PT);
4. further subdivide the focus areas into knowledge that is related to *content* (to the substantive area) and knowledge that is related to *structure* (to the operation of scripts);
5. develop script recognition cues; and
6. compare these cues to the script construction criteria of expert information processing theory to ensure compliance of the cues with theory.

The foregoing steps outline a relatively general adaptation process that can be utilized by researchers in many domains to extract "script cues" from a given literature that are consistent with expert information processing theory. In the following section, the application of this method in the new venture formation context is demonstrated.

6.3.4 Script Structure and Content

A fairly large sampling of literature that describes the individual attributes, experiences, resources, and prior training possessed by entrepreneurs, and the characteristics of successful new ventures themselves, is available. Regarding the extent of the literature review, the application of the "sampling" approach suggested earlier necessitates the exercise of some latitude in judgment on the part of the researcher. Given the objectives of this chapter, it was deemed appropriate to utilize

approximately 3 years of a specialized journal plus related texts in entrepreneurship. Accordingly, the literature review was undertaken by reviewing issues of *The Journal of Business Venturing*, the bibliographies of several prominent entrepreneurship texts, relevant expert information processing theory articles, the cognition-related work in entrepreneurship, and the reading lists for various doctoral seminars in strategy and entrepreneurship. From among several hundred titles reviewed, 28 citations that, based upon the judgment of the researchers, conform to the previously defined structure and content criteria were selected to demonstrate the sampling of knowledge from which new venture formation scripts derive. Sample citations are included both in the References section of this chapter and in Table 6.3, which illustrates the results of the sampling process. Table 6.3 citations for each knowledge category are organized under the headings " Sequence" and " Norms" and are subdivided under these two headings into references dealing with "Content" (new venture formation) and those dealing with "Structure" (expert information processing theory), as suggested in the previously developed framework.

With structure and content examples from relevant literatures selected, it becomes possible to derive script cues. The set of script recognition cues from which the items utilized in this chapter are drawn are shown in Table 6.4.

The next step in the analysis is to evaluate the structural and content veracity of script cues for compliance with expert information processing theory criteria. For the sake of simplicity and to demonstrate the "usability" of the suggested framework, a set of decision rules that follow from expert information processing theory has been adopted for convenience in this chapter and is proposed at least as a beginning point for extensions of this approach. These decision rules, along with the abbreviations used in the analysis, are as follows:

1. A script recognition cue should comply with either a "metarule," a script construction "step," or a causal "syntax" rule (Read, 1987).
2. A script recognition cue should derive from one of the knowledge categories, e.g., individual attributes (IA), experiences (IE), resources (IR) or prior training (PT), and/or organizational characteristics (OC).
3. The script recognition cue should describe either new venture formation sequences (SQ), norms (N), or both (SQ/N).
4. The script recognition cue should contain either content (C) or structural (S) elements.
5. A citation (Cite) from the entrepreneurship or expert theory literature should support, respectively, structure or content.

Table 6.5 provides examples of the results of the analysis. For each major set of theory criteria (metarules, script construction steps, and syntax rules), each of the knowledge categories is analyzed and construction implication exemplars are suggested. This analysis offers evidence that the script recognition cues derived in this chapter comply with expert information processing theory.

Table 6.3 Script content by knowledge area: new venture formation (content) and expert information processing theory (structure) literatures

Area	Sequence	Norms
IA	Content	Content
	More risk averse individuals become workers, while less risk averse individuals become entrepreneurs (Kihlstrom and Laffont, 1979); the search for an opportunity- resource match is a key feature of the entrepreneurial opportunity structure (Glade, 1967); project completion tied to Meyers–Briggs profile type (Ginn and Sexton, 1990); entrepreneurs have high tolerance for the ambiguity characteristics of new, unfolding situations (Schere, 1982)	Entrepreneurs have the qualities of assertiveness and initiative (McClelland, 1968); are moderate risk-takers who can tolerate ambiguity (Sexton and Bowman-Upton, 1985); are creators of new enterprise/combinations (Low and MacMillan, 1988; Schumpeter, 1934); use lock-in type strategic commitment to attain sustained competitive advantage (Ghemawat, 1991); have significant differences in attributes as identified by the Meyers–Briggs instrument (Ginn and Sexton, 1990)
	Structure	Structure
	Experts acquire a greater knowledge base in a specific domain (Glaser, 1984)	Expert action presupposes willingness even though mistakes might be made (Krueger, 1993)
IE	Content	Content
	Entrepreneurs engage in a deliberate process of network building (MacMillan, 1983); knowledge lies waiting to be discovered – entrepreneurs simply recognize changes which have already happened and exploit them (Loasby, 1983); previous venture experience is significant to venture performance (Stuart and Abetti, 1990); failure episodes cited as related to level of experience (Vesper, 1980)	Observed entrepreneurial attributes are the product of experience (Low and MacMillan, 1988); entrepreneurs' low need for support and conformity and high need for dominance and autonomy affects the nature of their experiences (Sexton and Bowman-Upton, 1985); entrepreneurs usually start firms related to their previous work (Cooper and Dunkelberg, 1987)
	Structure	Structure
	Experts possess a more elaborate schema which comes from more extensive experience (Chi et al., 1982); have better and less biased recall of relevant information (Fiske et al., 1983; McKeithen et al., 1981)	Becoming an expert takes extensive past experience (Lord and Maher, 1990); experts have better and less biased recall of relevant information (Fiske et al., 1983; McKeithen et al., 1981)
IR	Content	Content
	Sustained competitive advantage is a result of having and engaging strategic resources (Barney, 1991); the number of previous venture involvements is by far the most significant individual resource in early performance (Stuart and Abetti, 1990)	Entrepreneurs who raised their own venture funds had higher proportionate success (Vesper, 1980)

<div align="center">Table 6.3 (continued)</div>

Area	Sequence	Norms
	Structure	Structure
	Script entry depends upon having the objects required (Leddo and Abelson, 1986); novices do not have the resources (Perkins, 1985)	Proper script entry depends upon having the objects required (Leddo and Abelson, 1986)
OC	Content	Content
	The venture incubation process is fostered by contact with other entrepreneurs (Smilor and Gill, 1986); the process of internalizing commercial information implies increasing control of assets in a firm, i.e., entrepreneurship (Casson, 1982); establishing barriers to entry linked to strategic position (Porter, 1985); the steps of entrepreneurial decision making occur within a specific organizational setting (Glade, 1967); new ventures develop in stages (Churchill and Lewis, 1983)	Organizations where isolating mechanisms are high and appropriability is low have good entrepreneurial strategy (Rumelt, 1987); the entrepreneurial locus of control holds promise for distinguishing successful from unsuccessful ventures (Brockhaus, 1982); experienced venture capitalists have one or two major areas of emphasis which predominate in their thinking, e.g., management, unique opportunity, appropriate return (Hisrich and Jankowicz, 1990)
	Structure	Structure
	Experts' mental structures play an integral part in comprehending familiar events in a setting (Read, 1987); experts efficiently translate problem information in a situation into problem solutions (Glaser, 1988)	Experts efficiently translate problem information in a situation into problem solutions (Glaser, 1988)
PT	Content	Content
	Entrepreneurs expose themselves to information differently (Kaish and Gilad, 1991); understanding how value is built is a precondition for sustained competitive advantage (Ghemawat, 1991; Porter, 1985)	Entrepreneurship is a distinctly new discipline which should be studied (McMullan and Long, 1990); entrepreneurs tend to be better educated (Cooper and Dunkelberg 1987); more successful entrepreneurs had or acquired key skills (Vesper, 1980)
	Structure	Structure
	Experts acquire a greater knowledge base in a specific domain (Glaser, 1984); experts explain failure in terms of script knowledge (Leddo and Abelson, 1986)	An expert's schema is organized around key principles (Lord and Maher, 1990); story understanding affects attributions (Read, 1987)

Table 6.4 Script recognition cues based on expert information processing theory and new venture formation literatures

	Script cue
1.	I am rarely surprised by developments in a new business.
2.	Are you more attracted to people who are ready to take action?
3.	I have more highly developed contacts in the new venture area specifically.
4.	If asked to give my time to a new business I would decide based on how this venture fits into my past experience.
5.	There are times when after I finish a job I wish that I had done it better or worked harder at it.
6.	My knowledge about new businesses is fairly elaborate, due to the many variations I have observed.
7.	When investing in a new venture, I think it is worse to wait too long, and miss a great opportunity.
8.	I own assets such as proprietary technology, patents, or an operating business.
9.	When confronted with a new venture problem I can recall quite vividly the details of similar situations I know about.
10.	I have occasionally divulged a confidence when I should not have.
11.	When someone describes a problem with a new business I recognize key features of the problem quickly and can suggest alternatives from examples I can cite.
12.	It is worse to waste your time thinking over an opportunity than to plunge in without knowing all the risks.
13.	I have personally earned 150% compounded return per year on at least three ventures over 3 years, in cash.
14.	My new venture is/will be protected from competition by patent, secret technology, or knowledge.
15.	I have sometimes said mean, spiteful, or hateful things to people close to me.
16.	It is more important to know about creating new ventures.
17.	I want to get a piece of the big money.
18.	I presently control acquisition or expansion funds in an ongoing business or have my own funds available for venturing.
19.	New ventures, small business, and entrepreneurship are distinctly different disciplines.
20.	In the last 3 years the size of the pool of people and assets I control has grown.
21.	I have occasionally felt envious enough of the possessions of other people to think about stealing.
22.	I like to read periodicals which deal specifically with new ventures and start-up businesses.
23.	Imagine you have just funded a new venture: Would you be worried about not investing enough?
24.	I have started at least three successful new ventures.
25.	I value high payoffs; intelligent craftsmanship; being one-up; well-organized projects; dependability.
26.	During the last 3 years, it is the general consensus that my performance as an entrepreneur has increased.
27.	I am more aware of many new venture situations, some of which succeeded and others which failed, and why.
28.	If you had additional money to put to work, would you put it into a venture where you have a "say," even if there is no track record?
29.	New venture success follows a particular script.
30.	If I try to assess the condition of a new business a few questions lead to the relevant information.

Table 6.4 (continued)

	Script cue
31.	I do not mind being committed to meet a regular payroll if it means that I can have a chance at greater financial success.
32.	I am looking for a place to invest my resources.
33.	I am action oriented.
34.	I have failed in at least one new venture.
35.	My new venture is/will be protected from competition by franchise or other territory restrictions.
36.	I could raise money for a venture if I did not have enough.
37.	Do you want things open to the possibilities?
38.	I have enormous drive, but sometimes need others' help to complete projects.
39.	I understand how to buy low and sell high.
40.	The new venture stories I recall illustrate principles necessary for success.
41.	I am more comfortable in new situations.
42.	I feel more confident that I know a lot about creating new ventures.
43.	I like getting buyers and sellers together.
44.	When I see a business opportunity I decide to invest based upon how closely it fits my "success scenario."
45.	I can often see opportunities for my plans to fit with those of other people.
46.	If I have a lot of free time available, it is more desirable to find a new venture to put your time and expertise into than to engage in recreation.
47.	I am very good at a specialty that is in high demand.
48.	I often see ways in which a new combination of people, materials, or products can be of value.

Table 6.5 Script recognition cue compliance evaluation

Script cue	Script structure criterion (Read, 1987)	Area	SQ/N	C/S	Cite
6. My knowledge about new businesses is fairly elaborate, due to the many variations I have observed.	Step: Explicit embedding	IE	SQ	S	Chi et al. (1982): Experts possess a more elaborate schema
11. When someone describes a problem with a new business I recognize key features of the problem quickly and can suggest alternatives from examples I can cite.	Syntax: Mental states reason for action	OC	SQ/N	S	Glaser (1988): Experts efficiently translate problem information into problem solutions
22. I like to read periodicals which deal specifically with new ventures and start-up businesses.	Metarule: Concretion	PT	SQ/N	S	Glaser (1984): Experts acquire a greater knowledge base in a specific domain

Table 6.5 (continued)

Script cue	(Read, 1987)	Area	SQ/N	C/S	Cite
7. When investing in a new venture, I think it is worse to wait too long and miss a great opportunity.	Syntax: Acts enable mental states	IA	N	S	Leddo and Abelson (1986): Doing presupposes willingness even though mistakes might be made
2. Are you more attracted to people who are ready to take action?	Syntax: Mental states can be reasons for actions	IE	N	C	McClelland (1968): Initiative and assertiveness are characteristic of entrepreneurs
46. If you have a lot of free time available, is it more desirable to find a new venture to put your time and expertise into?	Metarule: Principle of least commitment	IR	N	C	Glade (1967): Opportunity search by entrepreneurs versus nonventure use of resources
	Script structure criterion				
3. I have more highly developed contacts in the new venture area specifically.	Steps: Connection to subsequent action	IE	SQ	C	MacMillan (1983): Entrepreneurs use a deliberate process of network building
8. I own proprietary technology, patents, an operating business.	Steps: Evaluation of congruence	OC	SQ/N	S	Leddo and Abelson (1986): Script entry depends on having the objects required
47. I am very good at a specialty that is in high demand.	Syntax: States can disable action	PT	SQ/N	C	Vesper (1980): More successful entrepreneurs had or acquired key skills
35. My new venture is/will be protected from competition by patent, secret technology, or knowledge.	Syntax: States can disable action	OC	SQ/N	C	Rumelt (1987): Isolating mechanisms imply good new business strategy
9. When confronted with a new venture problem I can recall quite vividly the details of similar situations I know about.	Steps: Connection of subsequently observed actions	IE	SQ/N	S	McKeithen et al. (1981): Experts have better recall of relevant information and it is less biased
19. New ventures, small business, and entrepreneurship are distinctly different disciplines.	Metarule: Concretion	PT	N	C	McMullan and Long (1990): Entrepreneurship is a distinct discipline

Area: The knowledge categories include individual attributes (*IA*), experiences (*IE*), resources (*IR*) or prior training (*PT*), and/or organizational characteristics (*OC*)

SQ/N: *SQ* sequence; *N* norms

C/S: *C* content; *S* structure

6.3.5 Summary

We have demonstrated an approach for "excerpting" representative and structurally consistent script content from a literature. It accomplishes the first objective of this chapter, which is to uncover the structure and content of particular knowledge structures that managers might use (Walsh, 1995: 282), in this case, new venture formation expert scripts – the terms scripts and knowledge structures often being used interchangeably. The result is a set of script cues that comply with the standards of expert information processing theory. The development of these script cues then makes it possible to address the second objective of this chapter, which is to relate the use of the identified knowledge structure (in our case entrepreneurial scripts) to consequences of substantive organizational importance.

6.4 Discriminating Experts and Novices

In this next part of the chapter we therefore explain in general terms how researchers can specify and test script-cue recognition-based models of the entrepreneurial mind. This objective may be accomplished in two steps: (1) components of the knowledge structure are derived and (2) the resulting component/constructs are used to classify sample cases by discriminating between new venture formation experts and novices.

6.4.1 Components

In interpreting the results of three studies that seek experts' explanation for script failure, Leddo and Abelson (1986) identify an opportunity to explore the components of expertise. Their findings suggest three possible components of expertise that might be observed empirically in making distinctions between experts and novices. Essentially, Leddo and Abelson propose that the opportunity to distinguish novices from experts occurs at two key points in expertise-specific situations, when the performance of an expert script (an attempt to utilize expertise) might fail. These points occur either (1) at the time of script "entry" or (2) as individuals engage in "doing" the things that serve the main goal of a script (e.g., take steps to form a new organization).

Script "entry" depends on "...having the objects in question" (Leddo and Abelson, 1986, 121). For example, an expert helicopter pilot requires a helicopter, an expert seismic geologist a seismograph, an expert trauma physician a well-equipped emergency room. Script "doing" means accomplishing the main action and achieving the purpose of the script. "Doing" depends on two subrequirements: ability and willingness. Ability is defined as possessing the rudimentary techniques and skills necessary to a specialized domain (e.g., closing the deal may depend on one's persuasive skill) (Leddo and Abelson, 1986, 121). Willingness, in turn, is defined as the propensity to act.

In the case of entrepreneurs, the "Entry" and "Doing" action thresholds of expert information processing theory parallel the theoretical (Shapero, 1982) and empirical (Krueger, 1993) action thresholds that explain individual intentions to form a new venture. Thus "Entry" (the beginning processes of organizational formation) depends on feasibility – specifically on arrangements resources from that environment such as capital, opportunity, and contacts, and "Doing" depends on a combination of ability and willingness. Since expert information processing theory suggests that expertise results from an individual's use of an expert script, it can be argued that new venture formation expertise ought to be related to individual scripts containing the "Entry"-based component "feasibility" and the "Doing" components "ability" and "willingness." It follows that discrimination among new venture formation experts and between experts and novices should be possible using these constructs. Thus, one common theme in the expertise-based entrepreneurial information processing literature is the following general proposition:

> Proposition: New venture formation expertise should consist of three components of expertise represented by the constructs: (1) arrangements, (2) willingness, and (3) opportunity-ability.

This proposition suggests a latent structure as a foundation to guide the identification and definition of a measurement model. This model is based on the script-cue recognition items derived using the previously described approach suggested by expert information processing theory (arrangements, willingness, and opportunity-ability). Once the entrepreneurial script components of this model are defined, researchers are then set up to discriminate, or classify, individuals' entrepreneurial expertise between expert and novice by testing the likely hypothesis, as further developed in the following paragraphs.

6.4.2 Classification

In addition to uncovering the components of managerial knowledge structures, we also – in this portion of the chapter – attempt to relate the use of knowledge structures to consequences of substantive organizational importance, specifically the formation of new ventures. We suggest that because of the well-known role of entrepreneurial outcomes, e.g., new organizations create jobs, foster innovation, and help keep an economy competitive in an era of increasing globalization, our better understanding of the nature of the influence of individuals' entrepreneurial mind on new business formation will have sustained importance to the scholarly community, because of its importance to the business community, and to society as a whole. In particular, the capability for researchers to reliably distinguish between expert and novice entrepreneurial minds opens new pathways for scholars to help people to calibrate their preparation to venture (e.g., Kruger and Dunning, 1999) and to better interpret venturing events (e.g., to become aware of the conditions under which failure is only a bump in the road, and when it is "game over," e.g., Mitchell et al., 2008)

This distinguishing capability is an applied specialty, where expert information processing theory, which suggests how to discriminate experts from novices, explains how experts use specialized scripts to outperform novices in domain-specific tasks such as entrepreneurship. Novices are expected to recognize cues in script problem statements differentially from experts (Glaser, 1984). To the extent that the occurrence of successful new venture formation by individuals is associated with expertise, discrimination between experts and novices using script-cue-based indicators of expert information processing entrepreneurs is possible. The following general hypothesis is representative of expectations in the discrimination task:

> Hypothesis: Differences exist among the mean vectors of entrepreneurial script-cue recognitions across expert and novice groups.

The research methodology that has developed to enable classification of individuals into expert and novice entrepreneur groups is script-cue recognition based and uses the three theoretical components of expertise suggested by expert information processing theory: arrangements, willingness, and opportunity-ability (e.g., Mitchell, 1994; Mitchell et al., 2000). In the next section of the chapter we present the "highlight films" of this methodology. Our purpose is to assist future generations of researchers who would like to use scripts-based research to further explore the entrepreneurial mind and to get a high-level view of the methods available and thus become familiar with the general issues and approaches that such future researchers should be cognizant of in their own work.

6.4.3 A Methods Template

In our research, we have established an empirical methodology that can apply the results of the literature review and analysis methodology described in the prior section of this chapter. We summarize it, using the standard methods section format: data gathering, measurement, analysis present in brief overview to provide an illustration as a point of departure for future research.

6.4.3.1 Data Gathering

Data in this type of research consist of observations of the script-cue recognitions of individuals. Data are collected through the use of a questionnaire that incorporates specific script-cue recognition items in an a priori relationship to the proposed theoretical components. In the past we have used various strategies for obtaining respondents: usually by working with an SBDC or Chamber of Commerce or through local assistants in a variety of countries and settings. In response to the present difficulty of accessing sampling frames for probability samples in social science research (Pedhazur and Schmelkin, 1991), and in international entrepreneurship research in particular (McDougall and Oviatt, 1997, 303), a purposeful sampling approach is

justified (Mitchell et al., 2000). Acceptable samples range in approximate size from 200 to 1,000 respondents depending upon the nature of the study.

6.4.3.2 Measurement

Each item in the questionnaire consists of a "two-alternative" multiple choice-type question. One alternative is the script cue as developed previously. The other, we suggest, should be a distracter statement, a plausible, even appealing alternative to those who are unfamiliar with new venture creation. Distracter statements that appeal to individuals' notions of social desirability (Crowne and Marlowe, 1964) or that conform to commonly accepted entrepreneurial myths add additional distinguishing power to script-cue recognitions as an empirical reference point, since the likelihood that novices will select a script cue is markedly diminished by the availability of an appealing but wrong choice that only an expert could avoid. Each script-cue recognition is coded "1," each nonrecognition "0," and these are added together to create interval-scaled variables (Nunnally, 1978).

6.4.3.3 Data Analysis

For empirically identifying the components of the scripts in the entrepreneurial mind, each script recognition cue should be logically linked to the construct that it represents (e.g., arrangements, willingness, and opportunity-ability). To examine the data structure and discriminant validity, an exploratory factor analysis is conducted on the set of variables linked to these constructs to ascertain the empirically derived components. If successful, items that load on factors consistent with the expectations of theory are used to form scales. Each resulting scale constitutes an indicator. To examine convergent validity, a reliability analysis using Cronbach's alpha is conducted.[5]

To verify that the constructs fit the latent structure expected, confirmatory factor analysis is used. Confirmatory factor analysis can be constrained in accordance with theory (Jöreskog, 1971). In this case the model is constrained to the three-factor expert information processing theory components of new venture formation expertise that are expected. Given the substantive specifications, statistical tests are used to determine whether or not the sample data are consistent with the theoretical constructs. Such tests as a P2 measure of the goodness of fit (Jöreskog and Sorbom, 1989), the overall goodness of fit index, the adjusted goodness of fit index, and the root mean square residual give indications of the fit of the confirmatory model with the sample data.

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[5]Over the history of measurement there has been a wide-ranging discussion concerning formative and reflective indicators. Howell et al. (2007) suggests that the current thinking would support the use of Cronbach's alpha in this case to be appropriate.

Classification of individuals into expert and novice entrepreneur groups[6] is also script-cue recognition based and uses the three theoretical components of expertise suggested by expert information processing theory: arrangements, willingness, and opportunity-ability. A multiple scale/two group multiple discriminant analysis is conducted to test the expert–novice discrimination hypothesis. The multiple discriminant analysis shows the level of association between a criterion variable with multiple categories (new venture formation expert and novice) and multiple predictor variables (expert information processing theory components of new venture formation expertise) as represented in the following functional relationship: Group Membership = f (Arrangements, Willingness, and Opportunity-ability). Interpretation of the findings is accomplished by evaluating the significance of the statistics related to the discriminant function, assessing the classification effectiveness of the discriminant model (jackknife analysis), and examining the discriminant loadings where applicable.

6.4.3.4 Summary

Over the past decade, we have been able to use the foregoing approach to answer Walsh's (1995) call: (1) uncover the content and structure of particular knowledge structures that managers might use and (2) "…relate the use of this knowledge structure to consequences of substantive organizational importance…" (Walsh, 1995, 282). What might then be in store for future research using entrepreneurial scripts to illuminate the recesses of the entrepreneurial mind?

6.5 Toward Further Study of Entrepreneurial Scripts

Consistent with the call by Walsh for research that moves "… beyond individual minds in our considerations of supra-individual knowledge structures" (Walsh, 1995, 311), this chapter highlights research wherein information processing in entrepreneurship is viewed as the result of human action wherein differences exist between the scripts of novices and the scripts of experts. At the very least, the foregoing analysis of expert cognitions in the specialized field of new venture formation shows that it is possible for management scholars to uncover the structure and content of a particular group knowledge structure – that of new venture formation experts – and relate the use of this knowledge structure to consequences of substantive organizational importance: discriminating new venture formation experts from novices using expert script cues. Unlike much of the previous work in the area, this portion of the chapter highlights the pioneering of the theoretical representation of

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[6]We have defined entrepreneurial experts as individuals who have (1) formed three or more businesses, at least one of which is a profitable ongoing entity; (2) formed a (nonlifestyle) business that has been in existence for at least 2 years; (3) experience in a combination of (1) and (2) that indicates a high-level organizational formation knowledge; or (4) career experience indicating high levels of familiarity with organizational formation.

knowledge structure attributes at the group (expert versus novice) level of analysis. It demonstrates practical steps that researchers can take to excerpt relevant script cues from a management literature. Then, like the large body of earlier work in the study of cognition in organizations (e.g., Wagner, 1987), the empirical portion of the chapter utilizes the representation that is derived in a questionnaire-based interaction between respondent and researcher to record and observe cognition-based behavior (in this case script-cue recognition), thus adding to the empirical work of Bougon et al. (1977) and Krackhardt (1987, 1990) a study that tests knowledge structure attributes at the group level of analysis.

There is a very real sense among information processing scholars such as Lord and Maher (1990, 1991b) that the consideration of alternative information processing models (such as thinking of people as expert information processors who utilize script-based knowledge structures) might suggest alternative methodologies for our examination of the practice of management. Aside from making progress in developing our general capabilities for describing and applying knowledge structures, this expert information processing theory-based alternative to understanding new venture formation may also bring other benefits. Specifically, the expert information processing theory-based lens has several implications for theory and practice in the new venture formation domain.

First, the application of expert information processing theory in this chapter shows the process whereby an understanding is developed (a) that new venture formation expertise has three components consistent with Leddo and Abelson (1986) and with cognition-based models of entrepreneurial intention (Krueger, 1993; Shapero, 1982) (Section 2 – Part I) and (b) that we can develop script-cue recognition items that serve as indicators of these component-constructs (Section 2 – Part II).

Second, there appear to be specific implications of the classification results. This chapter demonstrates how research can enable discrimination between new venture formation experts and novices using the script-cue-based indicators of expert information processing theory. As a research community, our having made (and continuing to make) this distinction is important, because it has provided theoretical and empirical assistance in resolving dilemmas surrounding the domain of entrepreneurship, particularly in its role in research on entrepreneurial cognition. The results reported in this chapter take a firm step in this direction. On the basis of the classification results, entrepreneurs no longer must be thought of stereotypically, and identified one-dimensionally as "born risk-takers" (Coulton and Udell, 1976), as having a high need for achievement (McClelland, 1965), as the product of an "enterprising childhood" (Litvak and Maule, 1971), or as masters of strategy and industry structure (Sandberg, 1986). Building on the notion of entrepreneurial skill advanced by Herron (1990), this chapter suggests that on the basis of script-cue recognitions, experts in new venture formation will consistently recognize cues from new venture formation scripts (Glaser, 1984; Read, 1987) better than will novices. The effectiveness ratios that we have found and reported over the years support this notion, showing that the discriminant function derived in the study contributes to improved discrimination between experts and novices.

Third is a look to the future. One of the most useful features of exploratory research is its potential for future research. Each step taken in this research has produced opportunities to extend the research. For example, the first part of the chapter introduces script structure criteria to the study of management cognitions, proposes a "sampling" versus "full enumeration" as a means for utilizing the content of expert scripts in research, and suggests explicit steps for the extraction and generation of script cues from a pool of scholarly literature. Are the script structure criteria fully tractable? Does sampling have too high a cost in the potential elimination of script richness? Is replication possible using the explicit steps suggested? Indeed, in answering one question, the first part of this research raises multiple follow-on issues.

Further, in the chapter we have been able to identify several weaknesses in the script-cue recognition items used to measure expert information processing theory constructs. Future research should examine the items from the present questionnaire to ascertain which ought to be used as exemplars for the construction of new script cues. Also, given what is now known about the common constructs of new venture formation expertise, it appears possible to select script cues that may more clearly be identified by respondents as relating to particular conceptual domains, thus "tightening up" the correlation between item and construct, and enhancing the overall internal consistency of the scales. A means whereby this instrument could capture the *strength* of script-cue recognitions would also be helpful.

Last, the chapter provides a starting point for other researchers who seek to utilize expert information processing theory to distinguish experts from novices vis-à-vis other relevant questions for entrepreneurship. For example, although this study was conducted using data obtained from respondents who function in the US economy, this is not to suppose that new venture formation expertise is limited to the United States alone. Indeed, cross-cultural application of the instrument used in this research has provided indications of new venture formation expertise as applied in other economic settings (e.g., Mitchell et al., 2000, 2002; Smith et al., 2009). Also, an underlying assumption of this research is that script cues extracted from the entrepreneurship literature apply on a cross-gender basis. This should be tested, and further research that uses the women in entrepreneurship literature as the basis for script-cue generation should be considered.

6.6 Conclusion

We demonstrate in this chapter that the suggestion that successful new venture formation is associated with individual knowledge-based scripts is a nontrivial suggestion. Further, we highlight how the process underlying this assertion fits into the larger research progression of work on information and information processing. As the previous 15 years have demonstrated, the link between expertise and new venture formation is very useful in helping entrepreneurship researchers illuminate the underlying dynamics of new venture formation so that the productive–destructive

aspects of starting businesses can be better managed. As has long been the case, the results of new venture formation are dichotomous. Newly formed organizations tend to be either highly rewarding successes or painful failures (Timmons, 1990). Unrivaled formation rates also coincide with unequaled failure rates (Cooper et al., 1988; Shapero and Giglierano, 1982). The success– failure dichotomy continues to challenge the researchers who study new venture formation to illuminate the underlying dynamics so that the productive–destructive aspects of the process can be better managed.

In this chapter we offer a deeper understanding of the influence of expert entrepreneurs as a group on new venture formation, highlighting the role of their expert scripts. Such an understanding is of critical importance at this point in time, especially given the impact of new venture formation on new jobs, innovation, and the global competitiveness of an economy. Accordingly, the scholarly community, the business community, and society as a whole stand to benefit greatly if "entrepreneurship as expertise" continues to live up to its potential as an integrating and explanatory notion. It is indeed heartening to be able to report that the structure and content of expert knowledge structures can be systematically identified and then utilized for making distinctions that are of organizational significance in a specific domain. We hope that these findings offer encouragement to others who might wish to replicate these findings in other areas of management specialty. Although the steps taken in this research are but a beginning, possibilities for additional insight portend. That "script," however, is yet to be written.

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