

Examining Entrepreneurial Cognition: An Occupational Analysis of Balanced Linear and Nonlinear Thinking and Entrepreneurship Success

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This empirical study advances entrepreneurial cognition research by examining whether entrepreneurs possess a high nonlinear (e.g., intuitive, creative, emotional) thinking style, as some studies and a common stereotype of entrepreneurs would suggest, or whether they possess a more versatile balance in both nonlinear and linear (e.g., analytic, rational, logical) thinking styles. As predicted, 39 entrepreneurs demonstrated greater balance in linear and nonlinear thinking styles than their professional actor (n = 33), accountant (n = 31), and frontline manager (n = 77) counterparts, though they did not significantly differ in thinking style balance from senior executives (n = 39). Unexpectedly, educational background was associated with thinking style balance, suggesting that years of formal education may contribute to one's versatility in utilizing both linear and nonlinear thinking styles. For the entrepreneur sample, linear and nonlinear thinking styles balance predicted years in current business after controlling for industry, number of employees, and demographic variables. Implications for future entrepreneurial cognition research and entrepreneurship education are discussed.

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Introduction

Entrepreneurial intent and subsequent activity are increasingly recognized as vital to economic viability and growth, and particularly worthy of considerable support and resource investment in education and economic policy (Aquino 2005; Floyd and McManus 2005; Garcia 2005). This widespread recognition is especially keen as organizations and governments struggle to survive a serious global economic crisis (Bosma et al. 2009; Lohr 2008). Successful entrepreneurship is based on the prudent use of multiple information sources, both formal and informal, providing new knowledge and information about potential venture opportunities, and about the appropriate utilization of knowledge gained from prior learning and work experience (Fiet 2002). Effective problem solving and decision-making in our increasingly uncertain and global business environment call for entrepreneurs who are not limited to traditional information sources and linear thinking patterns of rationality, logic, systematic analysis, reason, and cause-effect predictability (Siggelkow and Rivkin 2005), but also employ creative and lateral thinking, intuition, conscious emotional assessments, integrative and synergistic thinking, imagination, and insight (Csikszentmihalyi 1996; Damasio 1994; De Bono 1992; Maani and Maharaj 2004; Sadler-Smith and Shefy 2004). As a complement to linear thinking, these nonlinear cognition patterns for coping with the nonlinear dynamical nature of today's global business environment have been referred to as nonlinear thinking (Horgan 1989; Losada and Heaphy 2004; Sadler-Smith and Shefy 2004; Vance, Zell, and Groves 2008).

Thinking style has been described as one's preferred pattern for using mental abilities in addressing daily demands and activities, including perceiving and solving problems and challenges. Par-

tially developed through socialization and often operating unconsciously, an individual's thinking style also may consciously vary depending on perceived expedience and demands of a given situation (Dane and Pratt 2007; Sternberg 1994, 1997). In their recognition of viable new venture opportunities, successful entrepreneurs are commonly portrayed as relying heavily upon nonlinear thinking modes such as intuition, feelings and emotion, creativity, imagination, and optimism, all of which support risk-taking and perseverance in the face of obstacles and disappointments (Aquino 2005; Bird and Baron 2005; Blume and Covin 2005; Gartner 2005; Markman, Baron, and Balkin 2005; Runco 2004; Simon, Houghton, and Aquino 2000). In short, both popular business press and empirical research appear to offer some support for the notion that successful entrepreneurs possess a predominant nonlinear thinking and decision-making style compared with other successful professionals. For example, empirical studies by Allinson, Chell, and Hayes (2000), Blume and Covin (2005), and Corbett (2002) found that successful entrepreneurs demonstrate a greater intuitive thinking style though managers prefer an analytical or linear approach to information processing and decision-making. Similarly, Cardon et al. (2005) concluded that cognized emotion is a primary source of entrepreneur persistence and perseverance, problem solving, and absorption of market data toward successful decision-making. The incredibly fast pace of market change wedded with the volumes of data, environmental information, and other inputs, all calling for immediate new venture decision-making, tend to reinforce the perception that successful entrepreneurship requires a high degree of nonlinear cognition rather than the more plodding systematic and rational linear approach.

The discussion above suggests that entrepreneurs may possess a predomi-

nant nonlinear thinking style as opposed to a more linear style that emphasizes logic, analytics, and verifiable data. However, some studies support the claim that successful entrepreneurs may also rely upon data-driven and highly technical skills that require analytical, evidence-based, and systematic linear thinking and decision-making (e.g., Fiet 2002; Madsen, Neergaard, and Ulhoi 2003). In fact, our preliminary research (Groves et al. 2008), which compared the thinking style of entrepreneurs with that of professional groups commonly perceived as extreme on the linear and nonlinear continuum (accountants and professional actors, respectively), suggested that successful entrepreneurs may employ both dimensions. However, these findings lacked a useful perspective by not also comparing entrepreneurial thinking style with other "less extreme" groups, such as general managers, who have more common business professional responsibilities and have been more frequent sources of comparison with entrepreneurs in past studies (e.g., Baron 1998; Cunningham et al. 2002; Malach-Pines et al. 2002; Stewart and Roth 2001; Tan 2001).

The primary purpose of this study was to empirically examine the relationship between entrepreneurship and thinking style by comparing the thinking and decision-making styles of very diverse professional groups. Specifically, we sought to determine whether entrepreneurs possess a predominant nonlinear thinking style, as some studies and a popular stereotype of entrepreneurs would suggest, or whether a versatile and balanced linear and nonlinear thinking style is more characteristic of entrepreneurs compared with professional actors, accountants, frontline managers, and senior executives. Although previous research has examined demographic variables such as gender and academic major for the purpose of cross-validating the linear and nonlinear thinking style

construct and measure (see Vance et al. 2007), the focus on the present study was only on gaining a clearer general picture of entrepreneurial cognition.

This paper will first review current research on the alternating presence of both linear and nonlinear thinking styles that facilitate entrepreneurial cognition. Next, we examine the thinking style profiles of a sample of entrepreneurs and compare them with those of other professionals that generally are known to possess predominantly linear (accountants), predominantly nonlinear (actors), and moderately linear (frontline managers and executives) thinking style profiles. On the basis of self-reported thinking styles vis-à-vis the linear and nonlinear thinking style profile (Vance et al. 2007), we compare the thinking styles of each professional group using analysis of variance (ANOVA), mean comparisons such as Tukey's honestly significant difference (HSD) test, and hierarchical regression analysis techniques. Finally, we discuss important implications of our findings for future research and theory development in cognition and entrepreneurship, as well as for guiding entrepreneurship education and training programs.

Nonlinear Thinking Style Approaches for Entrepreneurship

Entrepreneurs operate in the context of nonlinear dynamical systems that are highly complex and rapidly changing, where a host of interdependent and interrelated parts interact and produce outcomes that are very difficult to predict. Such challenging contextual demands often severely impair the credibility and feasibility of long-range planning. As nonlinear systems demand that very complex decisions are made rapidly despite an overwhelming supply of information and data, some researchers assert that entrepreneurs frequently employ

"entrepreneurial logic" or nonlinear thinking processes such as insight, creativity, imagination, holistic thinking, and intuitive judgment based on experience to help them recognize market opportunities that are overlooked by other business professionals and managers (Blume and Covin 2005; Cunningham et al. 2002; Michl et al. 2009; Ward 2004). The following sections will examine several major components comprising nonlinear thinking style: intuition, creativity, insight, and emotions.

Intuition

This primary component of nonlinear thinking style has been defined as a general judgment or sense of knowing based on a subconscious synthesis of a wide range of currently presented data as well as information from one's collective experience (Dane and Pratt 2007). Although deemed in the past as inappropriate for serious application in professional organizations, intuition has gained broad support for its value in managerial and executive decision-making (Agor 1986; Burke and Miller 1999; Dane and Pratt 2007; Klein 2004; Sadler-Smith and Shefy 2004). In its automatic and unconscious appraisal of the interrelated parts of a nonlinear system providing a simplified "big picture" pointing to appropriate conclusions and new directions, intuition helps to avoid delay and getting lost in the detailed analysis of a large array of data (Claxton 2001). Miller and Ireland (2005) observed that intuitive decisions involve "novel approaches, changes in directions, and/or actions that run counter to prevailing thinking or data" (p. 21). Some empirical studies have examined how entrepreneurs tend to differ from other professionals associated with intuitive thinking and decision-making styles. An empirical study by Allinson, Chell, and Hayes (2000) concluded that entrepreneurs reflected a more intuitive cognitive style than the general population of managers, were no

different in cognitive style than senior managers and executives, and were more intuitive than middle and lower-level managers. Along the same vein, empirical studies by Blume and Covin (2005) and Corbett (2002) indicated that entrepreneurs possess a greater intuitive thinking style, whereas managers prefer a more systematic, rational, and analytical approach to processing information and making decisions.

Creativity

Although highly unpredictable and seemingly chaotic, nonlinear systems are characterized by periods of apparently unintelligible disorder that eventually emerge into new patterns of order (Holland 1998). As an appropriate thinking style component for addressing nonlinear systems, creativity is characterized by adroit flexibility and spontaneity (Runco 2004; Skordoulis 2004), where individuals in a highly focused state of thought take new, original perspectives and recombine interrelated parts of a system in novel and unconventional ways leading to effective problem solving (Csikszentmihalyi 1996; De Bono 1992; Peters 1998). The use of metaphors also can contribute to flexibility and creativity by encouraging a departure from a rut of thought through comparing a present problem with a seemingly unrelated object or system, providing new outlooks for gaining new insights about complex systems, and generating innovative, viable solutions (Morgan 1987; Tsoukas 1991). Reflecting on the centrality of creativity for the psyche of entrepreneurs, Bird (1989) remarked "...entrepreneurs tend to need and value creative expression" (p. 12).

Insight

This component of nonlinear thinking style is the result of a conscious and often frustrating unsuccessful attempt at the rational analysis of a problem, often followed by a period of attention else-

where (Hogarth 2001; Sternberg and Davidson 1995; Shirley and Langan-Fox 1996). According to some research, this break away from active analysis and attempted problem solving provides a healthy diversion of attention, releasing the person from a prematurely restrictive mind frame and erroneous set of assumptions and permitting a fresh new perspective and organizing assumptions upon returning to the problem (Segal 2004). Other studies and anecdotal accounts propose an incubation period involved with insight that automatically follows the fruitless rational problem-solving effort with an unconscious processing of information and data in non-logical and non-rational ways until a solution suddenly presents itself (Dorfman, Shames, and Kihlstrom 1996; Gibb 2004; Simon, Newell, and Shaw 1979). Whereas intuition is typically described as using integrated and holistic thinking on an unconscious basis (e.g., Sadler-Smith and Shefy 2004), insight is reached by initially studying a problem in a consciously analytic manner, followed by an unconscious cognitive process prior to the eventual sudden conscious emergence of the "aha!" or "big picture" of understanding (Nadler 2004).

Emotions

Ample evidence points to feelings and emotions as having a significant impact on thinking and decision-making at unconscious and conscious levels, both of which being potentially useful to entrepreneurs as they face complex systems and obstacles to new venture success (Damasio 1994; Dane and Pratt 2007; Sadler-Smith and Shefy 2004; Simon 1987). Emotion, whether conscious or subliminal, has been identified as a primary source of entrepreneurial perseverance and persistence in successful analysis of external market data and problem solving (Cardon et al. 2005). Neurological research indicates that

impaired emotional functioning can lead to a continual search and analysis of data, with the inability to reach a decision and move on in a timely manner due to being "dissatisfied" with a reasonable level of uncertainty (Damasio 1994). Our brain's limbic system, which plays a major role in human emotion, may unconsciously exercise complete control over our actions before the higher cognitive centers of the brain are fully aware and take conscious control (LeDoux 1996). These emotion-driven cognitive processes may scan an otherwise overwhelming presentation of data and predispose the focus of attention more deeply on a more realistic quantity of data. Finally, recent work on emotional intelligence and positivity in organizations suggests that constructive feedback, data analysis, and other activities in organizations that promote positive emotions can lead to confident and measured risk taking and contagious enthusiasm to more effectively address an otherwise daunting business climate that demands constant adaptation and innovation (Losada and Heaphy 2004; Zampetakis, Beldekos, and Moustakis 2009). Zhou and George (2003) note that existing empirical studies suggest that the creative process "... may happen simultaneously and recursively, instead of sequentially and linearly" (p. 550). In linking creativity with emotions, they hold that nonlinear dimensions such as emotions play a major role in the entrepreneurial creative process. For example, the perception, appraisal, and utilization of emotions to facilitate creative thinking may allow entrepreneurs to (1) better understand their own and others' dissatisfaction with the status quo and funnel this emotional energy toward improvement opportunities; (2) effectively manage emotions surrounding ownership issues so they do not interfere with linear cognitive processes; and (3) accurately perceive and manage their own and others' frustration during the idea implementation process.

The Role of Linear Thinking Style in Entrepreneurship

Despite the evident value of nonlinear thinking styles facilitating entrepreneurial cognition and decision-making, research also indicates that more linear patterns of thought can also be beneficial to entrepreneurs, and even help avoid the negative consequences linked with a dependence on nonlinear forms of thinking. Associated with the emotion dimension of nonlinear thinking, overconfidence and unrealistic optimism facilitating a propensity toward imprudent risk taking, lacking adequate rational assessment, have been identified as types of cognitive bias that can lead to serious negative outcomes of entrepreneurial decision-making (Forbes 2005; Simon, Houghton, and Aquino 2000; Sitkin and Weingart 1995). McGrath (1999) proposes that successful entrepreneurs adopt a real options reasoning approach, a decidedly linear thinking style, in order to offset faulty assessments of failure and anti-failure bias that may lead to business decisions with negative outcomes (McGrath 1999). An overreliance on nonlinear thinking styles at the expense of analytical reasoning and factual analysis produces other ineffectual consequences, including representativeness errors, counterfactual thinking, self-serving bias, planning fallacy, illusion of control, self-justification, and an erroneous belief in the "law of small numbers" (Baron 1998; Busenitz and Barney 1997; Simon, Houghton, and Aquino 2000). In addition, entrepreneurs' apparently nonlinear perspicacious market insights and seemingly clairvoyant opportunity recognition have been explained to actually be grounded to a significant extent upon very linear thought involving assessment of factual knowledge, direct experience, and careful analysis of market stimuli (Townsend and Harkins 2005).

Fiet's (2002) research supports the finding that linear thinking is a necessary element of the entrepreneurial process, and suggests that successful entrepreneurs routinely employ analytical, rational, and evidence-based thinking to the opportunity discovery process. Though entrepreneurs are commonly perceived as creating successful business ventures through their ground-breaking and creative thinking, propensity toward risk-taking, and extraordinary effort, careful analysis of successful enterprises indicates that entrepreneurs succeed "... not by bucking the odds, but by selecting an environment that they view as having an appropriate set of security arrangements, which probably includes being in close proximity to an information channel" (p. 53). Furthermore, Fiet asserts that, contrary to popular myths or stereotypes, entrepreneurs are very attentive to the types of information cues and environmental signals that have been useful historically and will be mindful of such data sources in making ongoing corrections to new venture plans. Clearly, the aforementioned fine-tuning, data-driven process that demands sharp environmental alertness indicates entrepreneurs indeed benefit from linear forms of cognition. Nevertheless, the linear underpinnings of entrepreneurial cognition are balanced by one's ability to quickly and lucidly recall prior relevant experiences and related "deposits of specific information" (p. 58), including work-related and on-the-job procedures, technology applications, and specialized education to enrich the perception of a perceived opportunity's prospects. This emphasis on the immediate recall and synthesis of relevant experiences and knowledge to inform the discovery process is consistent with the nature and utility of intuition in entrepreneurial thinking (Allinson, Chell, and Hayes 2000), whereby intuition facilitates an entrepreneur's ability to quickly and subconsciously retrieve previous experiences and insights that are

stimulated by a synthesis of key environmental cues and convert them into opportunity discoveries.

Entrepreneurship and Balanced Thinking Style

In contrast to a popular nonlinear stereotype of entrepreneurs as being primarily creative, visionary, and intuitive, the preceding review suggests that entrepreneurs utilize both nonlinear and linear dimensions in their overall cognitive processes, and employ either a linear or a nonlinear thinking style depending on situational circumstances and the different entrepreneurial and functional needs within an enterprise. We refer to this versatility or ability to use either linear or nonlinear thinking where warranted as "balanced" thinking style, where greater balance in linear and nonlinear thinking would be characterized as having greater versatility in using either nonlinear or linear dimensions. The notion of linear and nonlinear thinking style balance is supported by complementary areas of research, including Rowe's (2001) entrepreneurial model of "strategic leadership," which involves a balanced versatility in using managerial (i.e., linear) and visionary (i.e., nonlinear) leadership efforts for creating effective organizations. Linear and nonlinear thinking style balance is also conceptually consistent with the creativity research of Zhou and George (2003), who argued that multiple cognitive subprocesses comprising creativity (e.g., problem/opportunity identification, data gathering, idea generation, etc.) must involve both linear and nonlinear information sources and processing methods of that information.

The notion that successful entrepreneurial thinking demands versatility in linear and nonlinear information processing is also complemented by the entrepreneurial cognition research of Krueger and colleagues (Brannback and Carsrud 2009; Carsrud et al. 2009a;

Krueger 1993, 2000; Krueger and Brazeal 1994), which establishes a strong case for how successful entrepreneurs develop an "opportunity-friendly cognitive infrastructure" that either facilitates or impedes critical inputs for new venture opportunities. Krueger argues that entrepreneurs share mental models, scripts, and schemas whereby cognitive processes provide access to both opportunity schemas (positive) and threat schemas (negative). Research also supports the notion that opportunity recognition depends on perceptions that a situation is both positive in affect and controllable (Jackson and Dutton 1988), which is supported through versatility with linear and nonlinear inputs. Whereas critical environmental cues drive which schema is activated first or activated more strongly (Krueger 2000), opportunity recognition is ultimately dictated by the impact of such information and the manner in which it is interpreted. The present investigation similarly argues that the complicated interpretation and analysis of environmental cues and creation of dominant schemas demands an information processing style that employs both linear (i.e., "This situation is controllable because I have the specialized expertise to exploit this opportunity"; high perceived self-efficacy) and nonlinear thinking (i.e., "This situation is positive because it feels like the right thing to do and it does not exploit the community"; positive emotions).

In order to investigate whether entrepreneurial cognition is characterized by linear and nonlinear thinking balance, it would be informative to compare the thinking style profiles of successful entrepreneurs with those of other professional groups, particularly those with predominantly linear or nonlinear thinking style profiles. Based on our previous preliminary research and other studies, and because of the nature of their work and professional training, we would

expect professional actors to score, on a validated measure of linear and nonlinear thinking styles, significantly higher on the nonlinear thinking style dimension (Bromage 2000; Moshavi 2001; Pinard and Allio 2005). Professional actors' training and professional practice involve considerable improvisation, which has been defined as intuition guiding action in a spontaneous way (Crossan and Sorrenti 1997). Improvisation requires refraining from judging one's own and others' ideas (Weick 1998) and thinking without criteria by remaining open to different interpretations of a concept or idea (Izzo 1997). Nettle's (2006) empirical study of 191 professional actors portrays this professional group as significantly different from the general population, possessing a cognitive style with a strong emphasis on empathy, which is described as "the drive to identify another person's emotions and thoughts, and to respond to these with an appropriate emotion" (Baron-Cohen et al. 2003, p. 316). Consistent with these results is Baron-Cohen's (2002) vocational group research, which described actors as having a highly empathizing cognitive style though engineers and scientists possessed a highly systematic cognitive style distinguished by a "drive to analyze the variables in a system, to derive the underlying rules that govern a system, and to construct systems" (p. 248). These overall findings suggest that experienced, professional actors would be expected to possess a predominantly nonlinear thinking style.

H1: Professional actors will score significantly higher than entrepreneurs on frequency of utilizing a nonlinear thinking style.

Based on previous empirical research, and also because of their professional training, we would expect professional accountants to exhibit a preference for

linear thinking (e.g., Harris 1994; Smith 1999). For example, empirical studies by Jacoby (1991), Scarbrough (1993), Vassen, Baker, and Hayes (1993), Schloemer and Schloemer (1997), and Abdolmohammadi, Read, and Scarbrough (2003) demonstrate that as much as 50 percent of practicing accountants possess a thinking/sensing cognitive style with a preference for information drawn from the senses, objective facts, and an impersonal cause-and-effect analysis. However, the expected proportion of the U.S. population possessing this thinking style is in the 2.67–15.45 percent range (Myers and McCaulley 1985). Empirical studies examining accounting students (e.g., Booth and Winzar 1993; Fisher and Ott 1996; Geary and Rooney 1993) are consistent with the above assertion that accountants strongly favor a linear decision-making style distinguished by analytical and logical thinking and decision-making. Therefore, based on the above research we predict that professional accountants would tend to possess a predominantly linear thinking style.

H2: Accountants will score significantly higher than entrepreneurs on frequency of utilizing a linear thinking style.

In addition to assessing the thinking style differences between entrepreneurs, actors, and accountants, we also sought to make meaningful comparisons with the thinking style profiles of such common business environment counterparts as frontline managers and senior executives (Carsrud et al. 2009b). Prior empirical research by Allinson, Chell, and Hayes (2000) suggests that the thinking styles of entrepreneurs and managers at multiple levels (executive, middle, and junior-managers) differ in meaningful and significant ways. In comparing a sample of 156 entrepreneurs and 564 managers at multiple levels from various

organizations, they found that the entrepreneurs were (1) more intuitive in thinking style than the general population of managers; (2) no different in thinking style from senior executives; and (3) more intuitive in thinking style than middle and junior managers. Buttner and Gyskiewicz (1993) asserted that entrepreneurs are more innovative and creative than managers in large corporations, whereas Kaish and Gilad (1991) found that entrepreneurs demonstrate greater general alertness than managers and are less likely to rely on traditional analytical methods when appraising opportunities.

Based on prior research by Agor (1986), Isenberg (1984), and Mintzberg (1976), Allinson, Chell, and Hayes (2000) argued and found empirical support for the notion that intuition increases with managerial seniority. Mintzberg asserted that executives must often make decisions when they do not possess all requisite information or data, and that they frequently rely on "soft" data such as intuitive hunches to inform decision-making. As uncertainty and time pressures demand a decisive approach that precludes lengthy and systematic analysis, top managers increasingly rely on intuition to guide problem solving. Senior managers in Isenberg's study "... frequently by-passed rigorous, analytical planning altogether, particularly when facing difficult, novel, or extremely entangled problems ... whenever they did use analysis for any period of time it was always in conjunction with intuition" (p. 37). Similarly, Agor's survey of U.S. managers found that not only did senior managers use both intuition and analysis in decision-making and problem solving, but also rated intuition as especially important in highly uncertain situations in which facts, precedents, and time are limited.

The theoretical and empirical findings reviewed above suggest that entrepreneurs may indeed demonstrate greater

versatility in linear and nonlinear thinking styles than their professional actor, accountant, and frontline manager counterparts. The aforementioned extant research also suggests that executives rely on both linear and nonlinear thinking modes in decision-making and problem solving such that we would not expect significant differences in thinking style balance when compared with entrepreneurs. Thus, we propose the following hypotheses:

H3a: Entrepreneurs will demonstrate greater linear and nonlinear thinking style balance compared with professional actors.

H3b: Entrepreneurs will demonstrate greater linear and nonlinear thinking style balance compared with professional accountants.

H3c: Entrepreneurs will demonstrate greater linear and nonlinear thinking style balance compared with frontline managers.

H3d: Entrepreneurs and executives will not differ significantly in degree of linear and nonlinear thinking style balance.

The testing of the aforementioned hypotheses will advance the field's understanding of entrepreneurial thinking and specifically, the essential interplay between linear and nonlinear information processing in entrepreneurial decision-making. Prior empirical research on entrepreneurial thinking and cognitive style has primarily contrasted entrepreneurs and managers according to intuitive and analytical styles, respectively, whereas the present study aims to investigate the critical role of thinking style balance or versatility as a distinguishing characteristic of successful entrepreneurs by comparison with professionals in very diverse fields.

Method

Sample

Our sample consisted of 219 professionals comprised of 39 entrepreneurs (17.8 percent), 33 actors (15.1 percent), 31 accountants (14.2 percent), 39 executives/senior managers (17.8 percent), and 77 supervisors/frontline managers (35.2 percent). The overall sample included 135 men (62 percent) and 84 women (38 percent), and the mean age was 44.63 years (standard deviation [S.D.] = 11.25). The ethnic background of the overall sample was as follows: Caucasian ($n = 163$, 74 percent), Hispanic/Latin American ($n = 18$, 8 percent), Asian American ($n = 10$, 5 percent), African American ($n = 7$, 3 percent), Native American ($n = 4$, 2 percent), and Other Ethnic Background ($n = 17$, 8 percent). Regarding formal education, 80 percent ($n = 176$) of respondents had completed at least an undergraduate degree. Of these respondents, 70 had completed an undergraduate degree (BA, BS), 78 had completed a master's degree (MBA, MPA, MA, MS), and 12 had completed a doctoral degree (PhD, MD, JD). Table 1 presents demographic statistics across all professional groups.

Actors. The subsample of 33 actors represented a successful group of entertainment professionals. The mean age (46.13 years) of the actors was typical of the profession, whereas the number of years in the profession ($M = 12.84$) far exceeded the industry norm. The Screen Actors Guild (SAG), the main union of on-screen and on-stage performers in the United States, reports that the mean age of its membership is 44 years, whereas the criteria for eligibility are "3 days of background employment (non-speaking role) at SAG union rates, or one principal role (speaking role)" (SAG, 2008). By comparison, the 33 actors in the present study reported the following mean number of career roles: theatrical/film

(28.88), television (25.60), and radio (10.60).

Accountants. The subsample of 31 accountants also represented a successful group of professionals in terms of preparation and professional experience. According to the Institute of Management Accountants' (IMA) annual survey (Reichardt and Schroeder 2008), the average IMA member is 46 years of age and has 19 years of experience in the field. Overall, 50 percent of IMA members hold advanced degrees in a given year. The accountants in the present study had a mean age of 44.27 years and 20.67 years of experience in the profession, whereas 51 percent ($n = 16$) held advanced degrees (45 percent master's degrees; 6 percent doctoral degrees).

Managers. The frontline manager ($n = 77$) subsample also represented a group of highly successful professionals. As described in detail later, those frontline managers identified as "high potential" organizational leaders were invited to the annual conference where the survey administration took place. As such, the 100 managerial attendees of the conference represented a cross-section of the most successful managers at the large, international marketing company. The frontline manager subsample ($n = 77$) had a mean age of 41.99 years and a mean of 12.68 years of overall management experience.

Executives. Our subsample of executives ($n = 39$) also represented a group that would be commonly perceived as successful in their professional careers. They were recent alumni (within the last six years) of a very selective, small cohort class-size, working professional executive MBA (EMBA) program (i.e., largely weekend sessions) of a U.S. west coast private university. The rather stringent EMBA requirements included sig-

Table 1
Descriptive Statistics for Demographic Variables across the Professional Groups

Variable	Levels/Descriptives	Overall Sample	Accountants	Actors	Entrepreneurs	Supervisors/ Frontline Managers	Executives/ Senior Managers
<i>n</i>		219.0	31.0	33.0	39.0	77.0	39.0
Gender (<i>n</i>)	Male	135.0	15.0	15.0	34.0	45.0	30.0
	Female	84.0	16.0	18.0	5.0	32.0	9.0
Age	Mean	44.63	44.27	46.13	46.42	41.99	46.85
	S.D.	11.25	14.84	11.87	9.89	9.13	7.39
Ethnicity (<i>n</i>)	Asian American	10.0	2.0	1.0	2.0	4.0	1.0
	African American	7.0	0.0	1.0	4.0	2.0	0.0
	American Indian/Alaskan Native	2.0	0.0	1.0	0.0	1.0	0.0
	Caucasian	165.0	16.0	21.0	26.0	65.0	37.0
	Hispanic/Latin American	19.0	10.0	3.0	3.0	3.0	0.0
	Other	16.0	3.0	6.0	4.0	2.0	1.0
Education (<i>n</i>)	High School Diploma	9.0	0.0	2.0	1.0	6.0	0.0
	Two-year College Degree (<i>n</i>)	12.0	1.0	4.0	1.0	6.0	0.0
	Undergraduate Coursework (<i>n</i>)	10.0	0.0	4.0	1.0	4.0	1.0
	Undergraduate Degree (<i>n</i>)	76.0	11.0	9.0	7.0	34.0	15.0
	Graduate Coursework (<i>n</i>)	16.0	1.0	4.0	2.0	4.0	5.0
	Graduate Degree: Master's Level (<i>n</i>)	75.0	14.0	6.0	20.0	19.0	16.0
	Graduate Degree: Doctoral Level (<i>n</i>)	10.0	2.0	0.0	6.0	0.0	2.0
	Other (<i>n</i>)	11.0	2.0	4.0	1.0	4.0	0.0
Tenure in Profession	Mean	15.16	20.67	12.84	14.54	12.68	20.89
	S.D.	4.03	5.71	4.87	3.36	3.68	5.07

S.D., standard deviation.

nificant recent executive level responsibility, documented evidence of significant past managerial and leadership accomplishments, and stated expectations by senior representatives from their sponsoring and employing organizations of strong executive promise in the future. The average age of students in the EMBA program is 40 years, with 18 years of work experience and 11 years in management. Our older and more experienced subsample of executive alumni from this program had a mean age of 46.85 years and nearly 21 years of management experience.

Entrepreneurs. A total of 48 entrepreneurs participated in the study by completing the questionnaire described later. We sought to identify those individuals who were bona fide entrepreneurs engaged in ongoing entrepreneurial activities. Thus, we screened out those entrepreneurs who did not meet the following generally accepted criteria of entrepreneurial activity: three or more consecutive years of profitability and development of business innovations that led to three or more years of business growth (e.g., Brüdel, Preisendörfer, and Ziegler 1992; Cooper, Gimeno-Gascon, and Woo 1994; Goldsby, Kuratko, and Bishop 2005; Kirchoff 1994). Of the full sample of 48 entrepreneurs, 81 percent ($n = 39$) met both criteria and were retained for the present study. Across the final entrepreneur sample ($n = 39$), 100 percent ($n = 39$) described themselves as a founder or co-founder of the present company, and 100 percent ($n = 39$) reported sole ownership or co-ownership status in the present company. The entrepreneurs' current business had been in operation for a significant number of years ($M = 14.54$, $S.D. = 3.36$), and represented the following industries: consulting/professional services ($n = 7$, 18 percent), financial services ($n = 7$, 18 percent), computer software ($n = 6$, 15 percent),

real estate ($n = 6$, 15 percent), hospitality ($n = 5$, 13 percent) and a number of other industries (e.g., biotechnology, defense, health/fitness, and publishing; $n = 8$, 21 percent). The mean annual sales and mean number of employees at the entrepreneurs' current business was \$20.0 million and 137.76 ($S.D. = 61.46$), respectively.

Procedure

The procedures for recruiting entrepreneur, actor, accountant, frontline manager, and executive participants differed from slightly from each other. Entrepreneurs and accountants were recruited for participation through a local Rotary Club's monthly chapter meetings, a private medium-sized southwestern U.S. university's MBA alumni board meeting at which all attending accountants and entrepreneurs were asked to participate, and email solicitation to members of a large public southwestern U.S. university's entrepreneurial association. The actors were recruited through contacts made at the Southern California office of the SAG and at two SAG-sponsored meetings. Professional accountants were recruited through alumni contacts at large accounting firms in Southern California and through contacts made through the Southern California Chapter of the Institute of Management Accountants. The group of frontline managers was drawn from a large international U.S. marketing company. At the company's annual conference, 110 managerial attendees identified by top management as high potential leaders were asked to voluntarily participate in the study. Of the 93 managers who agreed to participate, 77 self-reported as "entry-level, frontline manager or supervisor" and were retained for the present study. The group of executives was recruited by one of the co-author who asked 50 former executive MBA students of a private, West Coast U.S. university to participate in the

study. Thirty-nine of these former students self-reported as "executive-level, senior manager" and were retained for the present study.

All participants were asked to complete a questionnaire consisting of a validated linear and nonlinear thinking styles measure (described later) and a series of demographic and professional background items. Participants recruited at professional association meetings completed the questionnaire on site, whereas the other participants returned the questionnaire through regular mail, email, or fax.

Measure

All participants completed the Linear and Nonlinear Thinking Style Profile (LNTSP) (Vance et al. 2007), a 26-item, four-dimensional, forced-choice self-report measure of decision-making style. The selection of a forced-choice instrument was key to the present study's objectives given potential social desirability concerns with alternative thinking or cognitive style measures. The four LNTSP subscales include external information sources (EIS, 8 items) and inner information sources (IIS, 8 items), which comprise the eight pairs of alternative words or phrases, and linear decision-making (LDM, 5 items) and nonlinear decision-making (NDM, 5 items), which comprise the five pairs of alternative behaviors. Using a Likert-type scale (3 = very often, 2 = moderately often, 1 = occasionally, and 0 = rarely or never), respondents were asked to allocate exactly 3 points across each pair of alternative statements according to how frequently they perform such behaviors (LDM and NDM scales). LDM includes linear items that represent the mental processing of external sources of information, including verifiable facts, analytical reasoning, and objective factors, for the purpose of rational decision-making and subsequent action whereas NDM reflects the processing of internal

sources of information, such as feelings and intuitive sense, for the purpose of guiding subjective decision-making and subsequent action. An example pair of statements includes, "I primarily rely on logic when making career decisions" and "I primarily rely on feelings when making career decisions." Also using a Likert-type scale (3 = very strong influence on how I behave, 2 = strong influence on how I behave, 1 = moderate influence on how I behave, and 0 = little or no influence on how I behave), respondents again were asked to allocate exactly 3 points across each pair of alternative words or phrases (EIS and IIS scales). EIS reflects external sources of information, data, and influences that guide an individual's decision-making and behavior whereas IIS represents inner or internal information sources such as feelings, sensations, and impressions that influence an individual's decision-making and behavior. Example item pairs include "Feelings" and "Facts," "Inner Knowing" and "Logic," and "Felt Sense" and "Reason." The Cronbach's alpha reliability estimates for EIS, IIS, LDM, and NDM were 0.86, 0.84, 0.77, and 0.74, respectively.

As mentioned before, balance in linear and nonlinear thinking styles refers to an even versatility in using either a linear or nonlinear approach, depending on the needs of a particular situation. On the LNTSP instrument, a high degree of balance would be indicated by an equal or nearly equal perceived frequency of using linear and nonlinear approaches over the 26 items of consideration. We cannot conceive of a thinking style that would be simultaneously linear and nonlinear. At a given moment, one is either using a linear or a nonlinear approach in thinking and problem solving. The LNTSP therefore employed a forced-choice approach to be consistent with alternative thinking styles in use: that is when one uses a linear thinking style *exclusively* with

regard to a particular situation or task (rated in our measure as a "3"), he or she does not engage in nonlinear thinking (rated as a "0"). Or, if one *occasionally* uses a linear style (rated as a "1"), he or she would therefore *usually* use a nonlinear style (rated as a "2").

Although validation studies (e.g., Vance, Groves, and Paik 2004; Vance et al. 2007) satisfactorily demonstrate the LNTSP's psychometric properties, it was necessary to verify the LNTSP's factor structure using confirmatory factor analyses (Arbuckle 2003) before proceeding with hypothesis testing. Specifically, a measurement model was created to assess the construct validity of the four LNTSP subscales. Postulating that each item would load significantly onto its associated scale, a measurement model was tested according to the following conventional indicators of fit: chi-square (χ^2), goodness-of-fit index (GFI), adjusted GFI (AGFI), root mean square of approximation (RMSEA), incremental fit index (IFI), and comparative fit index (CFI). On the basis of these conventional standards, the model demonstrated an acceptable level of fit ($\chi^2 = 245$ [degrees of freedom = 285, $p < .05$], GFI = 0.92, AGFI = 0.90, RMSEA = 0.06, IFI = 0.89, CFI = 0.90). The range of maximum likelihood estimates across the four factors was 0.58–0.81, suggesting that the items loaded satisfactorily onto their respective scales. Overall, the confirmatory factor analyses and reliability estimates provide satisfactory evidence of the LNTSP's factor structure.

Results

Descriptive statistics and correlations among the demographic variables and LNTSP scales for the overall sample ($n = 219$) are presented in Table 2. Gender demonstrated significant relationships with the LNTSP scales as women scored significantly higher on IIS ($r = 0.21$, $p < .01$) and NDM ($r = 0.15$, $p < .05$) and lower on EIS ($r = -0.23$,

$p < .01$) and LDM ($r = -0.20$, $p < .01$) compared with their male counterparts. Neither age nor education level were significantly associated with the LNTSP scales. The intercorrelations among the LNTSP scales were consistent with prior research (e.g., Vance et al. 2007) as EIS and LDM ($r = 0.48$, $p < .01$) and IIS and NDM ($r = 0.44$, $p < .01$) were positively associated whereas EIS and NDM ($r = -0.44$, $p < .01$) and IIS and LDM ($r = -0.39$, $p < .01$) demonstrated significant negative relationships.

The descriptive statistics across LNTSP scales for each professional group are presented in Table 3. As anticipated, the results demonstrate that the five professional groups differ considerably across the four LNTSP scales. Accountants score higher than all other professional groups across the EIS ($M = 15.17$, $S.D. = 4.09$) and LDM ($M = 9.47$, $S.D. = 2.51$) dimensions, whereas actors score higher across the IIS ($M = 15.08$, $S.D. = 4.40$) and NDM ($M = 9.65$, $S.D. = 2.37$) dimensions compared with the other professional groups. Executives scored higher on IIS ($M = 10.61$, $S.D. = 3.11$) and NDM ($M = 7.11$, $S.D. = 2.37$) and lower on EIS ($M = 13.35$, $S.D. = 3.08$) and LDM ($M = 7.85$, $S.D. = 2.38$) than their front-line manager counterparts, indicating that greater managerial experience may be associated with a greater utilization of nonlinear thinking style. In addition to mean scores across the four scales, Table 3 reports a linear, nonlinear, and linear and nonlinear balance score. The linear score represents the sum score of the linear thinking style dimensions, EIS and LDM, whereas the nonlinear score represents the sum score of the nonlinear thinking style dimensions, IIS and NDM. In order to assess balance across both dimensions, a linear and nonlinear balance score was calculated by taking the absolute value of the sum difference across the overall linear and nonlinear scores. As reported in Table 3, entrepreneurs appear to demonstrate greater

Table 2
Descriptive Statistics and Correlations for Demographic Variables and Linear and Nonlinear Thinking Style Profile Scales

	Mean (S.D.)	1	2	3	4	5	6	7
1. Gender ^a	1.37 (0.48)	—						
2. Age	44.63 (11.25)	-0.34**	—					
3. Education ^b	6.54 (1.72)	-0.10	0.11	—				
4. EIS	12.50 (3.14)	-0.25**	-0.02	0.04	0.86			
5. IIS	10.87 (3.11)	0.23**	0.01	-0.13	-0.42**	0.84		
6. LDM	7.42 (2.68)	-0.20**	-0.02	0.12	0.48**	-0.39**	0.77	
7. NDM	7.21 (2.56)	0.16*	0.05	-0.10	-0.44**	0.44**	-0.46**	0.74

S.D., standard deviation; EIS, external information sources; IIS, inner information sources; LDM, linear decision-making; NDM, nonlinear decision-making.

n = 219.

^a1 = male; 2 = female.

^b1 = Less than high school education; 2 = high school diploma; 3 = community college/two-year degree, 9 = graduate degree; doctoral level (PhD, JD, MD, etc.).

**p* < .05.

***p* < .01.

Table 3

Descriptive Statistics for Professional Group Scores across the LNTSP Scales and Linear and Nonlinear Balance

	EIS		IIS		LDM		NDM		Linear ^a		Nonlinear ^b		Linear and Nonlinear Balance Score ^c		
	n	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.	M	S.D.
Accountants	31	15.17	4.09	8.93	2.49	9.47	2.51	5.33	1.50	24.64	5.25	14.26	5.14	10.38	2.84
Actors	33	9.43	8.06	15.08	4.40	4.80	1.06	9.65	2.37	14.23	4.87	24.73	7.66	10.50	2.63
Entrepreneurs	39	13.09	3.70	11.44	2.08	7.69	3.35	7.42	1.43	20.78	5.47	18.86	5.46	1.92	0.64
Supervisors/Frontline Managers	77	14.15	2.57	9.85	2.57	8.15	2.07	6.85	2.07	22.30	4.03	16.70	5.03	5.60	1.85
Executives/Senior Managers	39	13.35	3.08	10.61	3.11	7.85	2.38	7.11	2.37	21.20	5.04	17.72	4.05	3.48	1.69

S.D., standard deviation; EIS, external information sources; IIS, inner information sources; LDM, linear decision-making; NDM, nonlinear decision-making.

^aLinear score represents the sum of the linear thinking style scales, EIS and LDM.

^bNonlinear score represents the sum of the nonlinear thinking style scales, IIS and NDM.

^cLinear and nonlinear balance score represents the absolute value of the difference between the linear and nonlinear scores.

balance ($M = 1.92$, $S.D. = 0.64$) across the linear and nonlinear dimensions than all other professional groups.

Hypothesis Testing

To test the hypotheses that the professional groups are significantly different with respect to thinking style, a series of ANOVA and mean comparisons were conducted. First, one-way ANOVAs comparing the groups' mean scores across linear ($F[4, 220] = 15.22$, $p < .001$), nonlinear ($F[4, 220] = 11.66$, $p < .01$), and linear and nonlinear balanced thinking ($F[4, 220] = 4.82$, $p < .05$) demonstrated that there were significant group differences across all three dependent variables. To control for alpha inflation and minimize the probability of Type I errors, Tukey's HSD test was conducted to test each hypothesis. H1 predicted that actors would score significantly higher on nonlinear thinking than entrepreneurs. Tukey's HSD demonstrated that actors' nonlinear thinking score was significantly higher than the score for entrepreneurs (mean difference = 5.87, $p < .05$), as well as for all other professional groups. Thus, H1 was supported. H2 predicted that accountants would score significantly higher on linear thinking than entrepreneurs. Tukey's HSD demonstrated that accountants' linear thinking score was significantly higher than the score for entrepreneurs (Mean difference = 3.86, $p < .05$), as well as for all other professional groups except frontline managers ($M = 2.34$). Thus, there was support for H2. Finally, H3a, H3b, and H3c predicted that entrepreneurs would demonstrate significantly greater linear and nonlinear thinking balance compared with actors, accountants, and frontline managers. Tukey's HSD test showed that the entrepreneurs demonstrated significantly greater balanced thinking than the accountants (Mean difference = -8.46, $p < .01$), actors (Mean difference = 8.58, $p < .01$), and frontline managers (Mean difference = 3.68,

$p < .05$). Thus, H3a, H3b, and H3c were supported. Entrepreneurs and executives did not demonstrate significantly different balanced thinking scores (Mean difference = -1.56, not significant). Thus, there was support for H3d. These results are summarized in Table 4.

To further assess linear and nonlinear thinking style balance across the professional groups, a hierarchical regression was constructed using linear and nonlinear thinking balance as the dependent variable. Because of multicollinearity concerns with the professional groups and thinking style preferences, age, gender, educational background, and thinking style balance were converted to z-scores. As illustrated in Table 5, gender, age, and educational background were entered as the first step in the model. To test the extent to which professional group status explains significant variance in thinking style balance beyond demographic variables, four of the five professional groups were dummy coded and entered as step two in the model. As expected, professional group status explained a significant amount of additional variance ($\Delta R^2 = 0.11$, $p < .01$) though entrepreneurs demonstrated the only significant relationship to thinking style balance ($\beta = -0.29$, $p < .01$) among the professional groups. Unexpectedly, educational background also emerged as a significant predictor of thinking style balance ($\beta = -0.17$, $p < .05$) in the final regression model. Overall, these results provide support for H3a, H3b, and H3c.

To further assess the relationship between linear and nonlinear thinking style balance and entrepreneurship, a hierarchical regression was constructed using years in current business as the dependent variable. Given the range of businesses and industries represented in the entrepreneur sample, we sought to select a generalizable measure of success across the types of entrepreneurial ventures. As illustrated in Table 6, gender, age, and educational background were

Table 4
Results of Tukey's Honestly Significant Difference Test Comparing Linear, Nonlinear, and Balanced Thinking Styles Across Professional Groups

Hypothesis	Dependent Variable	Target Group Mean	Comparison Group Means	Mean Difference
1	Nonlinear Thinking	Actors (24.73)	Accountants (14.26)	10.47**
			Entrepreneurs (18.86)	5.87*
			Frontline Managers (16.70)	8.03**
2	Linear Thinking	Accountants (24.64)	Executives (17.72)	7.01*
			Actors (14.23)	10.41**
			Entrepreneurs (20.78)	3.86*
3a, 3b, 3c, and 3d	Linear and nonlinear Thinking Balance	Entrepreneurs (1.92)	Frontline Managers (22.30)	2.34
			Executives (21.20)	3.44*
			Accountants (10.38)	-8.46**
			Actors (10.50)	-8.58**
			Frontline Managers (5.60)	-3.68*
			Executives (3.48)	-1.56

n = 219.

**p* < .05.

***p* < .01.

Table 5
Results of Hierarchical
Regression Analyses
Predicting Linear and
Nonlinear Balance^a

Variables	Model 1	Model 2
Gender ^b	-0.10	-0.11
Age	-0.05	-0.08
Education	-0.09	-0.17**
Group 1 ^c		-0.29***
Group 2 ^c		0.09
Group 3 ^c		0.06
Group 4 ^c		-0.12
ΔR^2	0.03	0.11
Total R^2	0.03	0.14
ΔF	2.35*	6.27***

$n = 219$.

^aStandardized regression coefficients are shown.

^b1 = male; 2 = female.

^cGroups 1, 2, 3, and 4 are $k - 1$ dummy variables for k different professional groups in the study. Group 1 = entrepreneurs; Group 2 = accountants; Group 3 = actors; and Group 4 = executives.

* $p < .10$.

** $p < .05$.

*** $p < .01$.

entered as the first step in the model. To control for differences across business types and industries, the number of employees at current business and the five major industries represented in the entrepreneur sample were dummy coded and entered as control variables in step 2. As expected, thinking style balance explained a significant amount of additional variance ($\Delta R^2 = 0.12$, $p < .05$) beyond the demographic and control variables whereas balanced thinking demonstrated a significant relationship with years in current business ($\beta = -0.32$, $p < .05$) in the final model. Overall, these

results provide support for the relationship between linear and nonlinear thinking balance and the longevity of business activities among entrepreneurs.

Discussion

The primary purpose of this study was to advance entrepreneurial cognition research by assessing the comparative extent to which entrepreneurs employ a nonlinear thinking style, consistent with a popularly held stereotype, or whether they possess a more versatile balance of linear and nonlinear thinking styles in problem solving and decision-making. As we found in a preliminary study (Groves et al. 2008), our present results indicate that indeed, entrepreneurs utilize much greater balance and versatility in linear and nonlinear thinking than their professional actor and accountant counterparts, whose predominant thinking style profiles followed expected patterns (e.g., actors greatly prefer a nonlinear thinking style though accountants favor a linear style). In a more conventional and revealing comparison, we also found, as expected, that frontline managers exhibit a more linear thinking style compared with entrepreneurs. Furthermore, entrepreneurs and senior managers demonstrated similar profiles with respect to the balanced use of linear and nonlinear modes of decision-making and problem solving. These results stand in stark contrast to the popular notion that entrepreneurs generally prefer intuitive, emotion-driven, and imaginative thinking and decision-making styles at the expense of analytic, data-driven, and logical thinking. Overall, our results suggest that entrepreneurs possess linear and nonlinear thinking style balance in both their alertness to diverse sources of information (e.g., internal and external sources) and the cognitive processing of such information to facilitate decision-making and problem solving.

Our results have potentially important implications for entrepreneurship educa-

Table 6
Results of Hierarchical Regression Analyses Predicting
Years in Business for the Entrepreneur Sample^a

Variables	Model 1	Model 2	Model 3
Gender ^b	0.06	0.06	0.06
Age	0.66**	0.60**	0.52**
Education	-0.29*	-0.24	-0.37*
Number of Employees		0.15	0.23
Industry 1 ^c		-0.13	-0.02
Industry 2 ^c		-0.18	-0.01
Industry 3 ^c		-0.13	-0.08
Industry 4 ^c		-0.17	-0.15
Industry 5 ^c		0.08	0.07
Linear and Nonlinear Thinking Balance			-0.32*
ΔR^2	0.62	0.06	0.12
Total R^2	0.62	0.68	0.80
ΔF	12.81**	0.71	7.83*

$n = 39$.

^aStandardized regression coefficients are shown.

^b1 = male; 2 = female.

^cIndustry 1, 2, 3, 4, and 5 are $k - 1$ dummy variables for k different industries represented by the entrepreneurs in the study. Industry 1 = financial services; Industry 2 = software development; Industry 3 = consulting services; Industry 4 = hospital-ity; Industry 5 = real estate; Industry 6 represents all other industries represented in the entrepreneur sample.

* $p < .05$.

** $p < .01$.

tion and the ongoing development and support of aspiring entrepreneurs. In presenting empirical results that offer greater insight into the thinking style of successful entrepreneurs, this study suggests that academic programs in entrepreneurship education that overemphasize the centrality of nonlinear thinking at the expense and even devaluation of linear approaches may risk developing future entrepreneurs who are prone to the cognitive errors associated with nonlinear modes of thought. However, entrepreneurship programs are typically set within a broader educational environment that reflects a strong linear bias in

curriculum and pedagogical approaches (Mintzberg and Gosling 2002; Pfeffer and Fong 2002). Nonetheless, the results of this study underscore the importance of linear and nonlinear thinking style balance for entrepreneurial cognition and the likelihood of new venture success, indicating that entrepreneurship education programs should include components that assist aspiring entrepreneurs with assessing and developing their thinking style versatility.

An unanticipated outcome of our study, where years of formal education were linked with thinking style balance (with those having fewer years of

formal education displaying stronger nonlinear thinking style profiles), suggests that education may actually serve an important function in building linear and nonlinear thinking style balance. In sharp contrast to the popular image of successful entrepreneurs as college dropouts (e.g., Budman 1997; Storey and Morgan 1998), our results suggest that successful entrepreneurs are more likely to possess a balanced linear and nonlinear thinking style profile and advanced education may help contribute to the development of such cognitive versatility. However, some scholars support the notion that universities and other higher education institutions with predominantly linear-oriented formal education inadvertently suppress intuitive, creative, lateral, emotional, and other dimensions of nonlinear thinking in the development of aspiring entrepreneurs (e.g., Paauwe and Williams 2001). On the contrary, our results suggest that attaining a traditional linear-oriented advanced degree may actually facilitate entrepreneurial success through building greater linear and nonlinear thinking style versatility and balance, particularly when entering students with less formal business education favor nonlinear thinking and lack the ability to judiciously and effectively use linear thinking tools in problem solving and decision-making. Our findings are consistent with those of recent studies (Marvel and Lumpkin 2007; Rauch, Frese, and Utsch 2005), which found the human capital variable of formal education to be related to new venture growth and innovation radicalness—both critical to entrepreneurship success. Therefore, our unexpected finding of a link between years of formal education and linear and nonlinear thinking style balance may help illuminate the debate regarding the importance of formal education to the entrepreneurship success, and should be the focus of future research.

The finding that executives also demonstrated linear and nonlinear thinking style balance lends additional credence to our hypothesis that the utilization of intuition and other nonlinear sources may increase with managerial seniority, given the range of concrete experiences, active experimentations and holistic experiential learning, and reflective observations that are accrued through greater managerial experience (Agor 1986; Allinson, Chell, and Hayes 2000; Isenberg 1984; Kolb 1984; Mintzberg 1976). This value of managerial experience as a vital source of human capital supporting entrepreneurship success (Rauch, Frese, and Utsch 2005) by increasing thinking style balance may help to further explain why Lange et al. (2007) found that their more-experienced Babson College BS alums launched businesses that performed substantially better than those founded by their MBA alums, who possessed significantly less entrepreneurship experience.

Future Research Directions and Limitations

This study examined the potential association between entrepreneurial cognition and linear and nonlinear thinking style balance. A compelling finding in our study is the observation of a positive link between entrepreneur linear and nonlinear thinking style balance and years in current business, suggesting that a balanced thinking style may be critical for new venture survival and viability. Future research should more specifically and directly examine the relationship between entrepreneur thinking style balance and key measures of business survival, longevity, and profitability across various industries and business contexts.

Although our findings here have focused on a general pattern of linear and nonlinear thinking style balance for successful entrepreneurs, we have not specifically examined the thinking style

patterns of entrepreneurs in different stages of the entrepreneurship process. Yet even in the new venture nascent and start-up stages where such nonlinear dimensions as creativity, vision, and flexibility are often considered paramount, more linear skills also are needed for maintaining meticulous attention to detail; and for supplying order, stability, and continuity (Johnson, Danis, and Dollinger 2008). Nevertheless, future research should begin to more carefully examine the possible prominence and interplay of linear and nonlinear thinking style dimensions within and across the stages of entrepreneurship and managerial functions of new venture creation and management.

Future research also should compare entrepreneurs' linear and nonlinear thinking style profiles with those of additional managerial groups from multiple levels and industries, as these professional groups have been frequently compared in other studies (Baron 1998; Cunningham et al. 2002; Malach-Pines et al. 2002; Stewart and Roth 2001; Tan 2001), to gain a broader perspective of entrepreneur linear and nonlinear thinking style patterns. According to Rowe's (2001) entrepreneurial model of organizational leadership in which linear (managerial) and nonlinear (visionary) performance dimensions are balanced, we may continue to find that successful entrepreneurs possess greater linear and nonlinear thinking style balance than early-career managers. As such, future research is needed to better understand the developmental implications for enhancing linear and nonlinear thinking style balance and versatility among managers in small, medium, and large organizations, leading to increased productivity through organizational *intrapreneurship* (Antoncic and Hisrich 2003; Carrier 1994; Thornberry 2003).

For the purpose of extending the present general depiction of entrepre-

neurial thinking style, future research should also examine possible variations based on such personal characteristics as gender and culture. For example, Vance et al.'s (2007) cross-validation research on linear and nonlinear thinking found that women tend to have higher nonlinear profiles than do men, a finding consistent with research on other thinking style measures (Allinson and Hayes 1996; Gardner and Martinko 1996). Past research also points to fundamental cross-cultural differences affecting perception and thinking style, such as a Germanic "uncertainty avoidance" favoring precision and predictability (Hofstede 1980; del Junco and Brás-dos-Santos 2009) that could predispose one toward linear thinking, whereas an Asian holistic thinking tendency (Nisbett 2003) might encourage a predominant nonlinear thinking style. This track of future research related to gender and cultural differences would be useful to ascertain whether there is a divergence of linear and nonlinear thinking style among entrepreneurs with diverse backgrounds and other personal characteristics.

The present study's findings should be considered in the context of several limitations. First, the relatively limited number of entrepreneurs may weaken the credibility of the findings concerning differences in thinking style profiles across the five professional groups. Second, the entrepreneur sample was largely comprised of consulting, professional, and financial service companies, which poses the potential concern that our findings may not generalize to high-tech industries such as biotechnology. Future research across a range of industries is needed to enhance the external validity of our findings. A third potential limitation involves the LNTSP's forced-choice methodology, which has been criticized by some researchers (e.g., Cornwell and Dunlap 1994) on grounds that the methodology potentially intro-

ducing false differences across scales. On the other hand, several other scholars (e.g., Chan and Bentler 1993, 1996; Saville and Willson 1991) have demonstrated that forced-choice, ipsative items produce reliable factors and also limit social desirability bias, a potentially critical concern when assessing thinking styles and other cognitive measures. Future research should utilize differing quantitative and qualitative methodologies and research designs to corroborate our findings concerning linear and nonlinear thinking style balance and advance the study of entrepreneurial cognition.

Finally, we also encourage empirical studies that examine how thinking style balance potentially impacts new venture start-up viability, profitability, and longevity across diverse industries. Particularly illuminating would be studies that simultaneously examine the relationship between predominantly linear, balanced, and nonlinear thinking style profiles and other emerging entrepreneurial cognition constructs, such as perseverance. Given that perseverance has been shown to be associated with successful entrepreneurs and higher new venture earnings (Markman, Baron, and Balkin 2005), the present study's findings suggest that future research may uncover a strong relationship between linear and nonlinear thinking style balance and high perseverance for successful entrepreneurs. In closing, we encourage entrepreneurship scholars to examine the relationships among thinking style profiles, including predominantly linear, nonlinear and balanced thinking, and the range of common entrepreneurial cognitive biases, such as overconfidence, excessive risk taking propensity, and counterfactual thinking (Baron 1998; Busenitz and Barney 1997). Overall, these research efforts stand to advance the field of entrepreneurial cognition and potentially produce valuable insights for the development of aspiring entrepreneurs and new venture success.

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