



RISK AND RATIONALITY IN ENTREPRENEURIAL PROCESSES

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This study begins with a historical overview of the connection between risk and rationality. It then broadens beyond this historical trajectory by taking entrepreneurship as a point of departure for understanding risk and rationality. Drawing from the research of Littlechild (1986), Buchanan and Vanberg (1991), and Sarasvathy et al. (2003), this study considers three entrepreneurial processes: opportunity recognition, opportunity discovery, and opportunity creation. Associated with each of these processes are unique conceptualizations of risk and rationality, reflected in distinct research streams. The final section of the study considers implications of the process-contingent nature of risk and rationality, and motivates a broadening of the research agenda from entrepreneurial decision making to practices. Copyright © 2007 Strategic Management Society.

Our understandings of risk and rationality are closely connected. In the prevailing view, evident in entrepreneurship and management research, as well as economics, finance, and decision theory, rational decision making consists of maximizing expected utility when decision makers face choices with risky (i.e., probabilistic) payoffs. These interrelated conceptualizations of risk and rationality have such taken-for-granted status among academics that we rarely ask how we arrived at this framing or explore alternative approaches to risk and rationality. Specifying mathematically tractable risky choice problems has allowed this line of research to advance by deriving precise rules for rational decision making. However, progress within a paradigm can stifle critical reflection about the limiting assumptions of the paradigm itself (Kuhn, 1962).

This study exposes the limiting assumptions of the understandings of risk and rationality reflected

in management and entrepreneurship research. To do so, it begins by tracing the historical origins of these understandings to the Enlightenment. Understanding that the current mainstream perspective is a historically situated perspective invites critical reflection on its limiting assumptions, which can stimulate thinking about alternative approaches to risk and rationality. The intent here is not to discredit the prevailing approach to risk and rationality, but to understand the boundary conditions that define where its conceptualizations of risk and rationality apply.

To broaden our thinking about risk and rationality, I propose to build upon some prior descriptions of different kinds of entrepreneurial processes. Drawing from Littlechild (1986), Buchanan and Vanberg (1991), and Sarasvathy *et al.* (2003), this study considers three entrepreneurial processes: opportunity recognition, opportunity discovery, and opportunity creation. The conventional framing of risk and rationality applies most directly to opportunity recognition, but is ill-suited for opportunity discovery and opportunity creation processes. Opportunity discovery calls for a rationality that informs search processes with indeterminate out-

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comes that present the potential for genuine surprises (Kirzner, 1997). Likewise, entrepreneurship as a process of opportunity creation raises some questions that challenge the mainstream conceptualizations of risk and rationality. If opportunities are created, rather than preexistent, how do we characterize their risk? What concept of rationality, if any, applies to entrepreneurship as a creative process? Drawing upon distinct streams of research clarifies the unique sources of risk and forms of rationality associated with recognizing, discovering, and creating entrepreneurial opportunities. In particular, expected utility theory and contract theory address risk and rationality in opportunity recognition; Carnegie School research on search processes informs opportunity discovery; Simon's (1981) 'science of design' research and research on creativity (Joas, 1996; Littlechild, 1986) convey competing views of opportunity creation.

The latter portion of this study addresses the implications of process-contingent forms of risk and rationality. I argue that entrepreneurs are not strictly bound to a single form of rationality; instead, they switch among rationalities. Whereas the prevailing view of risk and rationality privileges cognition and decision making according to explicit rules, entrepreneurial action expresses various rationalities, even though the nature of these rationalities and the criteria for switching among them may be largely tacit. This view motivates research examining risk and rationalities as reflected in what entrepreneurs *do*, not just how they decide, as they engage in distinct entrepreneurial processes.

ENTREPRENEURIAL RISK AND RATIONALITY IN HISTORICAL PERSPECTIVE

Discussions of risk and uncertainty in the entrepreneurship literature frequently reference Knight's (1921) classic definitions, yet portrayals of his definitions and theory do not always reflect careful attention to the details of his work (Langlois and Cosgel, 1993). In the opening chapter of *Risk, Uncertainty, and Profit* (pages 19–20), Knight distinguished between cases of 'risk,' with quantifiable probabilities, and 'uncertainty,' with nonquantifiable probabilities associated with alternative states. Knight argued that uncertainty was essential to explaining the nature of competition and profit. This connection makes Knight's discussion of risk and uncertainty

particularly germane to the field of entrepreneurship. By Knight's reasoning, only under uncertainty, rather than risk, can it be possible for entrepreneurs to supersede the normal returns associated with equilibrium in competitive markets.

In chapter 7, Knight distinguished three different kinds of probability situations: (1) '*a priori* probability' determined by mathematical computation for a known set of possible states, (2) 'statistical probability' based on classification of possible states and empirical data indicating their frequencies, and (3) 'estimates' where there is no basis for classifying states and, thus, no way to evaluate empirically their relative frequencies. Knight associated *a priori* probability with games of chance where the underlying structure giving rise to probabilistic outcomes is known, but he considered this case irrelevant to the business context. He deemed statistical probability and estimates to be extremes on a continuum of situations relevant to business decision making (Knight, 1921: 225–226). In cases of statistical probability, one can be confident that the observed probabilities approach the true probabilities (i.e., the probabilities inherent to the situation) as the sample size increases. For estimates, no such confidence is possible because of the inability to classify states (see Langlois and Cosgel, 1993). The perceived uniqueness of states, which may or may not correspond to their *actual* uniqueness, precludes estimating relative frequencies on the basis of empirical data. Knight (1921: 232) referred to this case as 'true uncertainty.'

Several aspects of Knight's treatment of risk and uncertainty merit comment. First, Knight expressed an appreciation for the distinction between 'ignorance' (an epistemological claim) and 'real indeterminateness' (an ontological claim) but chose the latter in developing his typology of probability situations (see pages 220–222; 314). Hence, Knight considered cases in which the decision maker assumes that the world itself is probabilistic. Second, Knight considered the case of risk defined as knowledge of probabilities in the *a priori* sense as irrelevant to business decision making. In his view, risk as a practical category can only apply to situations that approximate statistical probability. Third, neither risk as statistical probability nor uncertainty is devoid of personal judgment. Both involve subjective classification of states, albeit with different degrees of difficulty—ranging from straightforward to impossible. Fourth, Knight's claim about the inability to classify states refers to an *ex post* problem, not simply an *ex ante* dilemma. Under uncertainty, states defy

classification into categories even after they occur. Fifth, statistical probability requires doing the data collection, classification, and computational work (Knight, 1921: 234). In the absence of such statistical work, the decision maker is no better informed than under uncertainty.

For Knight, the rational response to uncertainty is to seek to reduce it to risk or, if that is not possible, to avoid investing altogether. To initiate a venture in the face of uncertainty is to act upon 'intuition,' 'whim,' or 'opinion,' rather than investing on the basis of expected profit. Rational decisions are only possible under risk, which permits computation of expected values and determination of whether the situation provides adequate compensation for the capital placed at risk. Hence, Knight's theory of rational entrepreneurship depends on individuals having different abilities to convert situations of uncertainty toward situations of risk (see Knight, 1921: 241–242; 269–270), not just their having differences in risk propensities (Kihlstrom and Laffont, 1979). Rational entrepreneurs accrue profits as they act on the basis of probability estimates that are clearer and more attractive than what others perceive.

How did Knight come to his particular conception of risk and its connection with rationality? Knight's references in chapter 7 of *Risk, Uncertainty, and Profit* provide some clues. In the first footnote of this chapter, Knight cited several key pieces that informed his understanding of risk and uncertainty. Within these cited pieces, economists such as Alfred Marshall, A. C. Pigou, and J. B. Clark are among the most frequently referenced sources. Knight himself cited Marshall's *Principles of Economics* in chapter 7 (page 211). In the discussion leading up to his three categories of probability situations, Knight referenced works in probability and statistics by various early contributors, including Karl Pearson, F. Y. Edgeworth, and Henri Poincaré. These references reflect Knight's familiarity with research integrating mathematics and economics in the late nineteenth and early twentieth century. Published in the same year as Knight's book, John Maynard Keynes' (1921) *A Treatise on Probability* reflected similar interests in probability and uncertainty, and indicates that both authors saw grappling with the implications of our inability to assign probabilities to future states as an important extension beyond economic theorists' reliance on the assumption of knowable probabilities.

Using probability theory as a way to frame risky decisions predates these immediate antecedents of

Knight's work. Knight's association of rationality with decisions aimed at maximizing expected returns under conditions of statistical probability was in keeping with thinking that developed during the Enlightenment in Europe. Conceptualizing rationality as maximization of expected utility dates back to eighteenth-century research on risky decision making by Daniel Bernoulli and Jeremy Bentham (see Bernstein, 1996: ch. 11). Prior to them, in the seventeenth century, Blaise Pascal had elaborated the computation of expected values as probability-weighted outcomes (see Gigerenzer *et al.*, 1989: ch. 1). An emphasis on individual decision making based on expected values characterized Enlightenment, or *modernist*, thinking. In keeping with this framing of rationality, Knight saw uncertainty as precluding rational action, due to ignorance of probabilities.

The assumption that knowledge of probabilities is a prerequisite for rational action was carried forward not only by Knight, but by other influential twentieth-century economists. For example, von Neumann and Morgenstern (1944) and Luce and Raiffa (1957) extended decision making based on expected utility to game theoretic problems. Savage (1972) framed his own contribution to decision making with subjective probabilities as building on Daniel Bernoulli's pioneering work on expected utility. Arrow (1951) not only associated expected utility models with rationality, but asserted that such models approximate how people actually behave.

Expected utility theory provided the backdrop for behavioral decision theorists to frame empirical research on risk preferences and cognitive biases. Researchers subsequently brought these interests to the study of entrepreneurial risk taking. Some researchers examined whether entrepreneurs are less risk averse than nonentrepreneurs, but empirical results did not substantiate this hypothesis (e.g., Brockhaus, 1980; Meier and Masters, 1988; Palich and Bagby, 1995). Miner and Raju (2004) conducted a meta-analysis of prior studies comparing the risk-taking propensities of entrepreneurs and managers, and concluded that the evidence did not indicate any difference. Instead, findings pointed to an alternative contention that entrepreneurs perceive business situations as less risky (Palich and Bagby, 1995) and returns as more controllable (Sarasvathy, Simon, and Lave, 1998) than do nonentrepreneurs. Entrepreneurs experience little regret and give little consideration to counterfactual alternatives to past events (Baron, 1999). These results align with evidence for over-

confidence (Busenitz, 1999; Busenitz and Barney, 1997; Cooper, Woo, and Dunkelberg, 1988) and escalation of commitment (McCarthy, Schoorman, and Cooper, 1993) among entrepreneurs. Entrepreneurs show a greater willingness to generalize from small samples than nonentrepreneurs (Busenitz, 1999). Combining insights from prior research, Wu and Knott (2006) proposed that entrepreneurs are risk averse regarding demand uncertainty but overconfident regarding their own ability, resulting in apparent risk seeking behavior.

However, neither entrepreneurial research done from a cognitive perspective, nor behavioral decision theory research in general, presents a challenge to the normative status of expected utility models of rational decision making. Instead, 'heuristics and biases' make up a residual category for deviations from rationality as defined by expected utility theory. By taking the expected utility model of rationality as the counterfactual for comparison purposes, behavioral researchers implicitly uphold the specification of the decision problem and normative understanding of rationality presented in expected utility theory. Behavioral research presents a *descriptive* alternative—but not a *normative* alternative—to the established model of rational decision making in risky situations. The extensive empirical evidence against expected utility theory as a descriptive theory has not displaced it as a normative basis for rational decision making (see Beckert, 1996; Starmer, 2000; Todd and Gigerenzer, 2003).

The stream of risk research from Knight (1921) forward has characterized entrepreneurial rationality as investment decision making when outcomes are probabilistic. Recognizing that this is a unique, historically-situated perspective raises the prospect that there may be alternative ways of understanding entrepreneurship that call for other perspectives on risk and rationality. The remainder of this paper pursues this prospect.

RISK AND RATIONALITY IN THREE ENTREPRENEURIAL PROCESSES

Littlechild (1986) compared three types of market processes, which he labeled the neoclassical, Austrian, and radical-subjective. The *neoclassical* approach—so labeled because of its prevalence in neoclassical economics—characterizes future prospects in terms of a probability distribution over known possible states. This view corresponds with

Knightian risk. The *Austrian* approach—associated with Kirzner and the earlier Austrian economists, Mises and Hayek—allows for present ignorance and the discovery of new possibilities in the future. Ignorance of possibilities is not the same as Knight's characterization of uncertainty; discovering new variables differs from being unable to classify and assign probabilities to the outcomes of known variables. The *radical subjectivist* approach emphasizes the role of human imagination in creating future possibilities that would otherwise not exist. Littlechild summarized, 'In this view, the future is not so much unknown as it is non-existent or indeterminate at the time of the decision. The agent's task is not to estimate or discover, but to create' (1986: 29). Outcomes are open-ended, depending not only on one's own creative acts, but also those of others. Whereas the neoclassical and Austrian processes incorporate some elements of human subjectivity (e.g., in perceptions of probabilities and the nature of inquiry), the radical subjectivist adds a distinct constructivist ontology.

Buchanan and Vanberg (1991) contrasted *creative* market processes with *allocative* and *discovery* processes. They associated creative processes with Shackle's (1979) radical subjectivism, which holds that the future is inherently unknowable because it is contingent upon nondeterministic human choices. The key themes in this perspective are choice, creativity, and the resulting openness of the future. Following Littlechild (1986) further, they connected the latter two processes—allocative and discovery—to neoclassical general equilibrium theory and Kirzner's (1985) theory of entrepreneurship, respectively. Operating as a neoclassical allocative process, markets achieve equilibrium when traders fully exploit the gains from a predefined set of production and market exchange possibilities. Although Kirzner's discussion overlapped at points with radical subjectivism, the essential equilibrative role of error detection and correction in Kirzner's theory reveals a conception of entrepreneurs as arbitrageurs, rather than creators of opportunities (see Kirzner, 1982, 1999). Prescience, rather than creativity, yields competitive advantages in discovery processes.

Sarasvathy *et al.* (2003) drew upon Buchanan and Vanberg's (1991) threefold categorization of market processes to elaborate three views of entrepreneurial opportunities, consisting of opportunity recognition, opportunity discovery, and opportunity creation (see also Venkataraman and Sarasvathy, 2001). *Opportunity recognition* involves matching known

Table 1. Three entrepreneurial processes

	Process 1	Process 2	Process 3
Littlechild (1986)	neoclassical	Austrian	radical-subjective
Buchanan and Vanberg (1991)	allocative process	discovery process	creative process
Sarasvathy, Dew, Velamuri, and Venkataraman (2003)	opportunity recognition	opportunity discovery	opportunity creation

products with existing demand. The entrepreneur connects dispersed knowledge regarding products and demand to exploit a previously unrecognized market opportunity. *Opportunity discovery* starts either from a known supply and proceeds in search of an unknown demand, or from a known demand that motivates search for an unknown supply. Once the missing side of the transaction is discovered, the market opportunity can be exploited. In both opportunity recognition and opportunity discovery, the entrepreneur acts as an arbitrageur. In *opportunity creation* neither the supply nor demand exists prior to entrepreneurial action; instead, the entrepreneur participates in creating both.

Table 1 aligns the three categories of market processes and entrepreneurial opportunities described by Littlechild (1986), Buchanan and Vanberg (1991), and Sarasvathy *et al.* (2003). The correspondence in these studies' categories provides a *prima facie* case for their utility in distinguishing entrepreneurial processes. Further support for this threefold typology comes from these authors' demonstration of how the assumptions underlying each of the three views organize prior entrepreneurship research. However, conceptual categories that are useful for building theory do not necessarily translate into clearly distinguishable empirical phenomena. As Sarasvathy *et al.* (2003) acknowledged, the three categories are confounded in entrepreneurial practice. Whereas opportunity recognition presumably could occur by itself, opportunity discovery entails recognition at some point in the process, and opportunity creation includes both discovery and recognition processes. Hence, I take this threefold categorization to reflect key assumptions that distinguish—and organize—prior research, not only in economics and entrepreneurship, but also in strategic management and organization theory to the extent that research in these fields addresses entrepreneurship. These three categories reflect conceptually distinct aspects of entrepreneurship that vary—and may overlap—in their descriptive relevance for any particular entre-

preneurial process. Nevertheless, a typology does not cease to be relevant just because empirical cases do not conform in all respects to its ideal types.

In the remainder of this section, I elaborate the understandings of risk and rationality within each of these three entrepreneurial processes.

Risk and rationality in opportunity recognition

Entrepreneurship as opportunity recognition draws upon the modernist understandings of risk and rationality, as described earlier. The description of opportunity recognition provided by Sarasvathy *et al.* (2003) suggests a correspondence to Knight's (1921) notion of risk as 'statistical probability.' The set of possible future states may be known but in the absence of complete futures markets, individuals draw upon their own limited information to estimate subjectively the probabilities of alternative states (Hirshleifer and Riley, 1992). Potential entrepreneurs with disparate information can estimate probabilities that differ in their values and accuracy (Norton and Moore, 2002). Consistent with this conception of risk is a notion of rationality as maximizing the subjective probability-weighted utilities of possible outcomes. Opportunity recognition requires foresightful attention to alternative states and their performance implications.

Whereas asymmetric information provides the basis for advantages over other potential entrepreneurs in the recognition of opportunities, asymmetric information also can pose an obstacle to transacting in input and product markets. Asymmetric information can eliminate opportunities for mutually-beneficial trades that would take place if everyone shared complete information (Akerlof, 1970). Hence, a key aspect of entrepreneurship as a process that improves allocative efficiency is to provide information and assurances that overcome buyers' and suppliers' information disadvantages and mitigate the risks of entering into transactions with unpredictable results (see Darby and Karni, 1973).

A prescriptive implication is that rational entrepreneurs seek to control or hedge contingencies that affect firm performance. Given knowledge of possible states and subjective estimates of their probabilities, transacting parties may agree to develop complex contingent claims contracts that address the allocation of risk and provide compensation for risk bearing. Contingent claims contracting involves specifying *ex ante* the contingencies associated with a transaction and *ex post* settling up based on the state that eventuates. Transacting buyers and suppliers can engage in ancillary transactions with outside parties (e.g., insurance companies or futures traders) who pool and bear risk but have no direct involvement in the product or service being exchanged. Because of such transaction possibilities, risk presents its own set of entrepreneurial opportunities.

There are, of course, some widely acknowledged obstacles to creating complex contingent claims contracts to reallocate risk. The challenges to overcome include adverse selection (Akerlof, 1970), moral hazard (Jensen and Meckling, 1976), and misperceptions of probable losses (Slovic, Fischhoff, and Lichtenstein, 1982; Slovic *et al.*, 1977). More generally, the costs associated with writing contracts and our inability to anticipate all possible contingencies, their implications, and probabilities make contingent claims contracts inherently incomplete in practice.

To the extent that external markets for transferring risk fail or are inefficient, firms may choose to control or hedge risk through operational and strategic hedging. *Operational hedging* mitigates threats to firm performance arising from problems in the production of goods and services (including delays, inefficiency, inconsistency, and safety hazards). It includes efforts to improve quality and safety, and increase operational flexibility. Investments in flexibility confer options to expand, contract, or switch activities, thereby allowing firms to respond as

uncertain contingencies unfold over time. *Strategic hedging* involves choosing strategies that reduce expected risk. Firms can reduce their exposures to uncertain contingencies by gaining control over key contingencies, changing their product-market portfolios, or increasing organizational flexibility (see Miller, 1992). Real option analysis seeks to evaluate the determinants of the payoffs to investments in operational and strategic flexibility and, where possible, place a forward-looking value on such investments.

For purposes of the current discussion, the key point regarding these contractual and noncontractual (i.e., operational and strategic) approaches to managing risk is that they take for granted the assumptions about risk and rationality associated with a view of entrepreneurship as opportunity recognition. These hedging strategies emerge within a particular view of risk and rationality that assumes knowledge of possible states and some ability to estimate their probabilities and effects. Although there is widespread acknowledgement that this view presents difficulties in practice—due to asymmetric information, moral hazard, and perceptual biases—researchers' attempts to address these difficulties generally uphold the core assumptions about risk and rationality associated with opportunity recognition. The identified problems are problems from within the view of entrepreneurship as opportunity recognition, rather than critiques stemming from alternative views of risk and rationality. For example, the incomplete contracts literature posits governance and institutional arrangements that differ from those that would exist if complete contracting were feasible, but it still maintains the objective of finding a second-best alternative defined in terms of Knightian risk and rationality as maximizing expected utility.

In Table 2, the column with the heading 'Opportunity Recognition' summarizes the characteristics for

Table 2. Characteristics of three entrepreneurial processes

	Opportunity Recognition	Opportunity Discovery	Opportunity Creation
Environment	imposed	selected	constructed
Risk	unpredictability	unknowability	uncontrollability
Action	valuation	search	causation effectuation
Vision	foresight	hindsight	creativity
Logic	exploitation	exploration	identity
Goals	exogenous	adaptive	endogenous

this entrepreneurial process. The dimensions considered in this table, listed in the left-hand column, include the nature of the environment, how risk arises, and the facets of entrepreneurial rationality—action, vision, logic, and goals. For opportunity recognition, the environment is exogenously given, or imposed.¹ Risk arises from inability to predict future environmental states (i.e., there is more than one state with a nonzero probability of occurring). The fundamental action of the entrepreneur is to value investment opportunities. This is done through forward-look valuation based on a logic of opportunity exploitation (i.e., arbitrage). The entrepreneur's goals are exogenously given, as in neoclassical microeconomic theories of firm and consumer behavior. Maximizing with respect to these goals, given the constraints of the problem, constitutes the notion of rationality associated with opportunity recognition.

Table 2 also presents contrasting portrayals of the environment, risk, and rationality for opportunity discovery and opportunity creation, as discussed next.

Risk and rationality in opportunity discovery

Entrepreneurship as a discovery process involves venturing into the unknown. For an outcome to be a genuine discovery, it must not be known in advance—even if the attributes that would characterize a successful discovery are known (Simon, 1976). The prospect of discovering an opportunity assumes that the domain to be explored is exogenously given and real, but unexplored—at least for the particular entrepreneur undertaking the search. The ontological assumption is realism (i.e., the opportunity exists independent of the entrepreneur), which is consistent with opportunity recognition but contrasts with the constructivist ontology of opportunity creation. Faced with an incomplete picture of an opportunity—in terms of the supply and/or demand—the entrepreneur seeks to discover what else exists to make feasible a new venture.

Although Kirzner (1997) associated opportunity discovery with Knightian uncertainty, his characterization also emphasized the dispelling of ignorance. Discovery replaces *ex ante* ignorance with newly identified feasible states and may make possible esti-

mates of their probabilities, thereby transforming the entrepreneur's situation into one of Knightian risk. With the learning brought about by discovery, the *ex post* ability to classify states and assign probabilities can be quite different from the situation prior to searching. Because opportunity discovery involves searching under 'sheer ignorance' (i.e., not knowing that we do not know) it can produce genuine surprises (Kirzner, 1997). By contrast, the only unknown element in opportunity recognition is the eventual state, which can be anticipated as one possible outcome within a finite set of probabilistic outcomes known at the time of deciding whether to pursue an opportunity.

Search is the essential entrepreneurial activity leading to opportunity discovery. Search can be experiential or cognitive (Gavetti and Levinthal, 2000). In the former approach, learning takes place through feedback from experiences in the world. The latter approach involves thought experiments or modeling to consider possibilities and their implications. Search can also be vicarious, as an entrepreneur seeks to learn indirectly from others' experiences (Huber, 1991).

Search tends to be proximate to the domain of current problems and past solutions (Cyert and March, 1963). Compared with distant search, local search follows more closely routines established by past experience. The more proximate the search, the more directly analogical reasoning from past experiences informs the search process (Gavetti, Levinthal, and Rivkin, 2005). The tendency toward searching locally carries the implication that the resulting discoveries produce incremental improvements, rather than radical changes that can arise from distant search. What is discovered through local learning may be inferior to possible outcomes from broader search (Levinthal, 1997). Nevertheless, the logic of local search lies in its potential to leverage past learning, thereby increasing search efficiency and reducing risk.

Although there is an inherent element of the unknown in all search processes, the alignment between past search experience and the chosen new search domain affects the skillfulness of the subsequent search process. Prior knowledge in a similar domain can make it possible for an entrepreneur to anticipate potentially fruitful ways to search and some of the possible search outcomes—but never with the assurance that all possible outcomes are foreseen. Because of incomplete knowledge of possible outcomes, the probabilities assigned to the

¹Table 2 makes use of Bandura's (1997) distinction between imposed, selected, and constructed environments.

subset of possible outcomes that are anticipated are inherently ambiguous. Nevertheless, search based on such partial knowledge is more informed than random trial-and-error search under complete ignorance. Knowledge of how to search is much more fundamental than knowledge of probabilities, because the chosen search procedure affects the set of possible outcomes and their probabilities of being discovered.

The capacity to search for new knowledge has a tacit dimension, reflecting our ability to draw upon knowledge subsidiarily (i.e., nonfocally) and exercise personal judgment (Polanyi, 1962). Because of his recognition of this tacit dimension in the process of scientific discovery, Polanyi rejected the notion that the search for novel knowledge could ever be conducted solely based upon explicit rules. The discovery process has personal aspects (e.g., skills, judgment, and creativity), even when the outcomes to be discovered exist independent of the entrepreneur.

Because the search domain is unbounded, there can be no rule for choosing the optimal duration of a search. Search involves finding a satisfactory, rather than an optimal, outcome (Simon, 1955). From the entrepreneur's perspective, whether an opportunity is satisfactory or not depends in part on the opportunities available outside the entrepreneurial realm, i.e., the opportunity cost of foregoing other employment (Gimeno *et al.*, 1997) or other exploitative uses of available resources (March, 1991). Failure in the search process can lower aspirations, and success can raise aspirations (Simon, 1955; March and Simon, 1958; Cyert and March, 1963). In this view, although the dimensions in which goals are defined are exogenously given, aspirations adapt based on one's own experience as well as the experiences of others in a relevant reference group. Adaptive aspirations differ from goals as purely exogenous and fixed, as in neoclassical economics, but stop short of making the arguments in entrepreneur's preferences fully endogenous.

Susceptibility to various learning errors contributes to the risk associated with opportunity discovery. In addition to the well-known type I and type II errors (i.e., accepting a false hypothesis and rejecting a true hypothesis, respectively) search may be simply misguided due to misunderstanding or misrepresenting the problem to be solved. Answering the wrong question is what Kimball (1957) and Mitroff and Featheringham (1974) called an 'error of the third kind.' A type III error occurs when an entrepreneur

pursues a question that has no bearing on discovering the kind of opportunity sought. Further errors arise because opportunities are explored sequentially, rather than concurrently. Entrepreneurs may be susceptible to undersampling opportunities that are similar to those that previously produced failures (Denrell, 2003; Denrell and March, 2001).

The middle column of Table 2 summarizes the distinctive characteristics of entrepreneurship as a discovery process. Here, the area of the environment in which the search is conducted is selected by the entrepreneur. Risk arises because of the inherently unknowable aspects of the search process and its potential outcomes. Rationality is expressed in exploratory search, learning from experiences, and attempting to achieve aspirations. Entrepreneurs have limited ability to formulate expectations, so learning occurs by assessing discovered outcomes retrospectively. Goals for the discovery process adapt based on experience over time.

Risk and rationality in opportunity creation

The key distinguishing feature of opportunity creation is that the entrepreneur has a causal role in bringing the opportunity into being (see Alvarez and Barney, 2007). The opportunity does not exist prior to the entrepreneur's initiative. Thus, the ontology of opportunities is constructivist, in contrast with the assumption of pre-existing opportunities in the cases of opportunity recognition and discovery.

There are two schools of thought regarding creativity in opportunity creation. One school is typified by Herbert Simon's (1981) research on the 'science of design.' The process of solving design problems involves problem specification, alternative generation, and evaluation of alternatives (Simon, 1965). Simon's discussions of the design process emphasized the evaluation of alternatives, and he said remarkably little about alternative generation. He explained alternative generation as drawing upon past learning through a process of search and recombination that produces possible solutions to design problems. In Simon's portrayal, design problems have a close resemblance to discovery problems. Possible solutions originate from prior knowledge and exploring the nature of the problem itself. Sequential trial-and-error evaluation of alternatives can identify a solution that resolves a design problem. Simon's portrayal of design problems made them solvable by heuristics similar to those applied to discovery problems.

Simon's approach admitted no uniquely human capacity for creativity. Simon believed that alternative generation could be automated, and this belief undergirded his work on artificial intelligence. To illustrate the generation and evaluation of design alternatives, Simon (1965) cited the use of computers to determine chess moves. He expressed optimism that computers could be programmed to solve problems in ways comparable to humans (Langley *et al.*, 1987; Simon, 1990; Simon and Newell, 1958). By this view, '... creative activity appears simply to be a special class of problem-solving activity characterized by novelty, unconventionality, persistence, and difficulty in problem formulation' (Newell, Shaw, and Simon, 1962: 66).

A competing school of thought holds that creativity is an essential human capacity that entrepreneurs bring to opportunity creation. By this view, creativity includes problem solving, but is not reducible solely to such (Hatchuel, 2001). In advocating a threefold typology of market processes, Littlechild (1986) insisted that human imagination is the distinguishing feature of creative processes. Chiles, Bluedorn, and Gupta (2007) recently pointed out that the central role of creative imagination in Ludwig Lachmann's (1986) theory of entrepreneurship differentiates his perspective from those of other Austrians such as Kirzner and Schumpeter. Creativity is generative. It involves reinterpreting and seeing new possibilities in vague problems (Hatchuel, 2001). People exercise personal judgment in formulating problems, retrieving or seeking information, and generating and evaluating alternatives (Ward, 2004). Interpretation and imagination draw upon tacit knowledge, and it is because of this tacit dimension that creativity defies automation according to codified algorithms (Polanyi, 1962, 1966). Creativity involves generating novel alternatives that are causally underdetermined by learning from past experiences.

Creativity presupposes freedom of action (Joas, 1996). Creative choices are not predetermined; they are *genuine* choices that could have differed from what was actually chosen.² As Loasby explained, 'To be genuine, choice must be neither random nor predetermined. There must be some grounds for choosing, but they must be inadequate... Choice must also make a difference' (1976: 5). Choice is an 'originating force' (Buchanan and Vanberg,

1991). Hence, human creativity makes the future indeterminate. Human actions make up a complex, evolving (i.e., nonequilibrium) social system with nondeterministic outcomes. Outcomes reflect one's own choices and actions in combination with those of other people. Such a characterization of the social system does not preclude forming expectations, but it makes them inherently fallible (Shackle, 1983).

By choosing, individuals pursue personal goals, but there is no *telos* at the level of the aggregate socioeconomic system (Buchanan and Vanberg, 1991; Sarasvathy *et al.*, 2003). Instead, complex systems can exhibit unanticipated emergent properties. Within a socioeconomic system, creativity gives rise to risk, only part of which is borne by the initiating entrepreneur. What one person or firm views as an act of 'creative construction' is, from another's view, 'creative destruction' (Agarwal, Audretsch, and Sarkar, 2007). Outcomes from our actions may be interdependent, yet we often act in ignorance of the nature of such interdependencies. As interdependence increases, complex systems become more susceptible to failure (Dörner, 1996; Perrow, 1984). Social institutions help to mitigate the risk associated with interdependent actions by reducing—but only partially—the unpredictability of others' actions (e.g., Beckert, 1996; Dequech, 2006; Loasby, 1999). In view of such risk, a reasonable heuristic may be to limit entrepreneurial investments to 'affordable losses' (Sarasvathy, 2001; 2003).

Sarasvathy's (2001) distinction between causation and effectuation provides further insights into the courses of action associated with opportunity creation. *Causal logic* involves selecting means to achieve chosen ends. To follow causal logic requires clarity of goals and an understanding of means-ends relations. *Effectual logic* starts with available means and chooses among feasible ends. Following effectual logic requires only general aspirations, and specific goals emerge in the entrepreneurial process. The entrepreneur's preferences and goals both shape and are shaped by the effectuation process. Preference formation is an on-going learning process in which the entrepreneur's choices matter, along with other social and situational influences. Making preferences endogenous undermines reasoning based solely on expected future outcomes. As March summarized the dilemma: 'Rational choice involves two kinds of guesses: guesses about future consequences of current actions and guesses about future preferences for those consequences' (1978: 589). Endogeneity of

²For background on this view, known as 'libertarianism,' see de Rond and Thietart (2007).

preferences goes beyond aspiration level adjustment by adding and deleting preferences over time.

Table 2 associates opportunity recognition and opportunity discovery with logics of exploitation and exploration, respectively. In addition to distinguishing between exploration and exploitation in his 1991 article, elsewhere March proposed a logic of appropriateness (March, 1994; March and Olsen, 1989). This logic applies rules that determine appropriate actions based on one's identity and assessment of the situation faced. Rather than attempting to determine future consequences and preferences, this approach to decision making suspends the logic of consequences. Such reasoning interprets and applies norms established by tradition within a community, in conflict with a view of rationality as universal and consequentialist.

Because the context of opportunity creation is less than fully specified, one's sense of identity is an important starting point for initiating entrepreneurial action. Sarasvathy (2003) proposed that entrepreneurs begin from knowledge of who they are, what they know, and whom they know. Xu and Ruef (2004) provided survey evidence that entrepreneurs view identity fulfillment as more important than pecuniary benefits, whereas a control sample did not. Decision making grounded in one's sense of self and place within a community seems particularly fitting for processes of opportunity creation, where courses of action are causally underdetermined and, hence, the entrepreneur's choice set is unbounded. Identity motivates and guides self-expressive creative action. Furthermore, coming to a sense of identity is itself an active process admitting creativity.

The right-hand column of Table 2 summarizes the key aspects of risk and rationality within the entrepreneurial process of opportunity creation. In contrast with treating opportunities as exogenously given (as in opportunity recognition and discovery), social construction of the environment accords with human creativity. The context is controllable, but only to a limited extent, resulting in risk. The freedom of others to act creatively is a source of irreducible uncertainty (Boulding, 1982). Entrepreneurial action can proceed according to a logic of causation or effectuation (Sarasvathy, 2001). Both logics treat the opportunity as created, but effectuation makes goals endogenous and emergent, rather than logically prior to creating an opportunity. As contrasted above, creativity can be understood as proceeding on the basis of problem-solving heuristics that draw upon prior knowledge (e.g., through novel recom-

binations) or as an expression of personal freedom (making creativity different from either deterministic or random acts). In the latter view, creativity draws upon past learning but is not fully constrained by it. Finally, I have argued that identity provides a critical logic for the initiating role of the opportunity-creating entrepreneur. Entrepreneurship arises not only from looking *forward* (i.e., anticipating future prospects) and looking *backward* (i.e., learning from experience), but also from looking *inward* (i.e., as an implication of one's sense of self).

IMPLICATIONS AND SPECULATIONS

Recognizing that the prevailing conceptualizations of risk and rationality in entrepreneurship research reflect developments growing out of a particular historical context weakens any claims—actual or implied—to their descriptive or normative universality. Furthermore, distinguishing three types of entrepreneurial processes clearly identifies the context in which the mainstream perspective on risk and rationality applies—namely, opportunity recognition. The assumptions underlying the expected utility perspective on risk and rationality have little relevance for entrepreneurship as opportunity discovery or opportunity creation. The limiting assumptions of the prevailing perspective are inconsistent with the nature of discovery and creation processes and the reasoning and actions that they evoke. As such, we must decide whether such processes involve decisions and actions that are inherently irrational, or whether they suggest that entrepreneurs express variants of rationality that go beyond what is reflected in most risk research. I have taken the latter approach by drawing upon some relevant research to characterize the sources of risk and the nature of rationality within each of the three entrepreneurial processes.

The idea that risk has different meanings and sources is not original to the current study (see Baird and Thomas, 1990; Miller and Bromiley, 1990). Conceptualizations of risk relevant to entrepreneurship include novelty and innovation (Miller and Friesen, 1982), performance variability and unpredictability (Bromiley, 1991), failure to meet targets (March and Shapira, 1987), and the threat of bankruptcy (Altman, 1968). This prior research points out that risk is a multidimensional construct and the meanings and sources of risk can differ across individuals and situations. What is original to this study is the motivation of different origins of risk—namely,

contingencies that are unpredictable, unknowable, and uncontrollable—from different types of entrepreneurial processes.

In order to determine whether there is any shared understanding within the varied presentations of risk in the management and entrepreneurship literature, it is helpful to distinguish between *meanings* of risk and *determinants* of risk.³ The determinants of risk are myriad. Management researchers often refer to the determinants of risk, including unpredictable organizational and environmental contingencies, as *uncertainties* (Miller, 1998). In strategic management discussions, *risk* generally refers to variability or downside variability in firm performance (Baird and Thomas, 1990; Bromiley, Miller, and Rau, 2001; Miller and Reuer, 1996). Some entrepreneurship researchers express a similar understanding of risk as unpredictability of returns or potential losses (e.g., Das and Teng, 1997; Forlani and Mullins, 2000; Janney and Dess, 2006). Using ‘uncertainty’ to refer to unpredictable contingencies affecting performance and ‘risk’ to indicate unpredictability or possible downside variability of performance more accurately describes the meanings expressed in entrepreneurship and strategic management research than do Knight’s (1921) classic definitions.

The term *rationality* refers to a normative basis for deciding and acting. In research areas taking statistics and expected utility theory as their basis for modeling decision making, conceptualizations of rationality emphasize explicit, general, maximizing rules. Researchers investigating *bounded rationality* seek empirical evidence regarding the degree to which individual decision makers deviate from such calculative rationality. Importantly, both streams of research (a) emphasize decision making over action and (b) allow that the decision rules need not be explicitly known to the decision makers themselves; that is, decision makers act *as if* following a maximizing rule or a suboptimal heuristic. The key difference in these two streams of research is that rational choice theorists take their normative models to be predictive of actual behavior, whereas bounded rationality theorists provide evidence to contradict this claim. Nevertheless, both sets of researchers frame the problems of interest in terms consistent with entrepreneurship as opportunity recognition. Their specified decision problems require foresightful valuations of probabilistic payoffs.

Processes of opportunity discovery and opportunity creation evidence other, often neglected, aspects of rationality. Both processes require action, not just decision making. These processes give rise to an understanding of rationality as performative, not simply cognitive. Rather than being universal, rationality is situational; it responds contingently and creatively to the perceived exigencies of particular situations. Rational individuals pursue what is feasible, given their finite cognitive and physical capacities. Rationality is dynamic, rather than static; it is amenable to learning over time. Rationality includes critical reflection on values and learned preferences, rather than treating values and preferences as exogenously given and fixed. Rationality is subjective, not objective; only through personal commitment does it become normative. Norms of rationality emerge within communities of practitioners (Thompson, 2005).

Rescher (1988) distinguished between *cognitive rationality* expressed in beliefs, *practical rationality* expressed in actions, and *evaluative rationality* expressed in normative appraisals. The modernist view of rationality privileges cognitive rationality, as evidenced in its emphases on theoretical knowledge and decision making. Models of risky decision making (following expected utility theory or behavioral decision theory) continue this emphasis on cognition and decision making to the exclusion of practical action. Such models treat evaluative criteria (e.g., preferences as expressed in a utility function or prospect theory’s value function) as exogenously given, rather than as learned outcomes or choices subject to rational deliberation. By contrast, Rescher (1988: ch. 9) argued that cognitive, practical, and evaluative rationality always function together; they are distinct aspects of a holistic understanding of rationality.

For those of us influenced by the modernist project of pursuing a single, universal characterization of rational decision making, proposing a view of rationality that involves a plurality of limited, process-contingent perspectives can be disconcerting. As argued earlier, even behavioral decision theorists have not anticipated such a move because their research indirectly upholds the singular normative notion of rationality formalized in expected utility theory. By contrast, this study of entrepreneurial processes motivated three distinct process-specific understandings of rationality. Such an approach to rationality follows MacIntyre (1988) in presenting a plurality of rationalities, and the associated dilemma

³ Ben-Zion and Shalit (1975) made a related distinction between the *measures* of risk and the *determinants* of risk.

of how to decide among competing rationalities to guide any particular action.

We could posit several possible responses to the dilemma posed by multiple entrepreneurial rationalities. One possibility is that choosing among alternative rationalities is not feasible. Instead, the rationality of any given entrepreneur is determined by past experiences. By virtue of their distinct histories, different entrepreneurs bring different rationalities, but any given entrepreneur operates only within a single rationality reflecting personal cumulative learning. A second possibility is that entrepreneurs have some ability to access and use alternative rationalities, but they are incapable of determining which rationality applies in a given situation. Either they cannot distinguish situations or they fail in practice to relate particular rationalities to situations. In this case, entrepreneurs are capable of switching rationalities, but their choices are arbitrary. A third possibility is that entrepreneurs operate according to meta-rational decision rules that guide situation-contingent decisions about which rationality to employ. Entrepreneurs discern the requirements of the situation and possess mental schema that associate different situations with different rationalities. A fourth possibility is that alternative rationalities are expressed in practical action. Rationalities have a tacit dimension that is evidenced in skillful entrepreneurial performances, rather than conscious and articulable decision rules. These last two possibilities both carry the implication that entrepreneurs make appropriate situation-contingent changes in their rationalities in use, but they differ in their emphases on cognitive processes and explicit decision making versus action.

Whether one of these perspectives is more compelling than the others is an empirical question, not one that can be answered by conceptual arguments alone. Each of these four possibilities has distinct empirically-testable implications, which make them a point of departure for future research. Here, I simply offer some theoretical arguments that challenge the first three possibilities and favor the fourth.

If entrepreneurs are confined to operating within a single rationality, then there seems to be a fundamental mismatch between their capabilities and the requirements of many entrepreneurial situations. Although it may be possible to imagine an entrepreneurial situation that involves just one of the three processes, many entrepreneurial efforts require integrating all three. Developing an entrepreneur-

ial venture may require engaging iteratively in the various processes (Ardichvili, Cardozo, and Ray, 2003). Sarasvathy *et al.* (2003) suggested that the three processes could be integrated by (a) nesting opportunity discovery and recognition within opportunity creation, (b) employing different processes at different stages (e.g., opportunities once created, are available for subsequent discovery and recognition), or (c) evoking each process in a context-specific manner. Earlier, I tried to demonstrate the value for analytical purposes of separating the three processes, but their combination in actual practice suggests that entrepreneurs accomplish feats involving all three forms of rationality.

Schrag's (1992; 1994) discussions of *transversal rationality* suggest a way to begin to address how it is possible that entrepreneurs transcend a single rationality. Schrag contended that although each of us indwells a local, specific form of rationality, we are not bound exclusively by our particular rationalities. Transversal rationality is the human capacity to relate to others who indwell alternative rationalities. Transversal rationality is a response to pluralism that seeks and, at least to some extent, achieves understanding outside any particular form of rationality. Transversing rationalities is a practical achievement that, like any discovery process, cannot proceed solely on the basis of a prespecified method because the nature of what will be discovered and how to arrive at this discovery are unknown *ex ante*. It involves finding an improvised 'fitting response' (Schrag, 1991) without having recourse to an acontextual universal rationality (Schrag, 1992, 1994). The possibility of operating according to more than one rationality follows as a reasonable implication of transversal rationality. If individuals are able to understand and appreciate more than one form of rationality, then such achievements suggest the possibility of drawing upon multiple rationalities for entrepreneurial reasoning and action.

If choices among rationalities are arbitrary, they should have no bearing on entrepreneurs' performances. The possibility that entrepreneurs invoke alternative rationalities arbitrarily constitutes the null hypothesis *vis-à-vis* situation-contingent, performance-enhancing application of rationalities. Under the null hypothesis, if an entrepreneur happens to choose a situation-appropriate rationality, it is simply a matter of good luck. For the choice of rationality to be arbitrary, it must be that the entrepreneur is incapable of evaluating whether the situation calls for opportunity recognition, oppor-

tunity discovery, or opportunity creation. By definition, opportunity recognition requires the entrepreneur's awareness of the nature of the presenting situation. By contrast, distinguishing between opportunity discovery and opportunity creation turns on the ontological assumption one brings to the situation—in particular, whether the opportunity already exists.

If entrepreneurs were to consciously employ decision rules to choose among alternative rationalities given their perceptions of situations, such rules could never be fully explicit or fully known to the entrepreneurs themselves. Classifying situations and mapping situations to courses of action cannot be reduced to straightforward applications of rules. Situations are ambiguous. Classification involves personal judgment and an unavoidable tacit dimension (Polanyi, 1962). Rules are never complete; they require interpretation (Taylor, 1995; Wittgenstein, 1958). Rationalities operate, to some extent, unconsciously (Hodgson, 1985). To use Polanyi's (1962) terms, rationalities have a tacit dimension and operate subsidiarily, rather than focally.

Because of this tacit dimension, entrepreneurs may be able to draw upon different rationalities in different situations, without being fully aware of the rationalities that their decisions and actions express. Entrepreneurs' ability to invoke different rationalities is learned through practice, and getting stuck in any particular form of rationality reduces the skillfulness of an entrepreneur's performance. Based on a review of prior research, Louis and Sutton (1991) observed that unusual or novel situations, results that deviate from expectations, and deliberate initiatives spur people's conscious engagement, as contrasted with reliance upon automatic cognitive processing. To use their phrase, such situations cause people to 'switch cognitive gears.' These same situational cues may challenge one's rationality in use, causing adjustments (i.e., learning) within rationalities and switching among alternative rationalities.

I conjecture that the cognitive dissonance provoked by using different rationalities in different entrepreneurial situations is limited because these rationalities are practical (i.e., demonstrated in practice) and, to a large extent, tacit. This characterization contrasts with the modernist emphasis on theoretical and explicit rationality. The tacitness of our rationalities may allow us to remain modernists in our espoused rationality, even as our rationalities in use

differ from the modernist view.⁴ Previous research shows that people explain their behaviors as resulting from deliberative decision making, even when this is not the case (Loewenstein, 2001). Staw (1980) argued that *ex post* justification may substitute for *ex ante* rationality, particularly when goals and cause-effect relations were unclear at the time of acting. The desire for justification may allow entrepreneurs to construct *ex post* explanations of their actions that correspond with norms of foresightfulness and calculative rationality, despite the situation-contingent nature of their rationality. Hence, researchers seeking to understand entrepreneurs' rationalities in use should seek real-time observational data, rather than relying solely upon entrepreneurs' retrospective accounts.

Asserting that rationality is practical does not exclude cognition and decision making, but goes beyond them by allowing that human action is more than cognition. Body and mind operate together in human action (Clark, 1997). Polanyi (1962) went to great lengths to argue that physical capacities operate in conjunction with mental capacities, and both are critical to performing skillfully. By this line of reasoning, we need not reduce the entrepreneur's capacity to operate according to distinct rationalities to a matter of deliberative choice. Instead, entrepreneurs can display alternative rationalities as practical expressions of their own activities, while the nature of these rationalities remains largely tacit. Exploring the complementarity of conscious and unconscious thought (Dijksterhuis and Nordgren, 2006; Hodgson, 1985) may shed light on aspects of entrepreneurship unexplored in prior research done from a cognitive perspective.

Research on risk has neglected the bodily and tacit dimensions of risk perceptions and responses. Risk as *analysis* prevails over risk as *feelings* (Slovic *et al.*, 2004). This orientation minimizes affective responses and intuition. It reflects the priority of abstraction over experience and a lingering mind-body dualism that are part of the legacy of Enlightenment philosophers. By contrast, March and Shapira quoted managers as making statements such as, 'No one is interested in getting quantified measures,' and 'You don't quantify the risk, but you have to be able to feel it' (1987: 1408). Such comments challenge the core assumptions of our theories of risk percep-

⁴This contention draws, in part, on Argyris and Schön's (1978) distinction between 'espoused theories' and 'theories in use.'

tions and risky decision making. As researchers, we have done little to follow the leads suggested by such observations from practitioners. Loewenstein *et al.* (2001) summarized previous research as showing that emotional responses to risky situations often better explain behavior than cognitive assessments of risk. Personal judgments about entrepreneurial opportunities depend not only on how people *think* about them, but also how they *feel* about them.

This discussion urges reorienting our research on risk and rationality toward an understanding of what entrepreneurs and managers *do*, not just how they think and decide. This orientation is in keeping with calls for research on strategy as *action* (Heraclous, 2003; Johnson, Melin, and Whittington, 2003; Tsoukas and Knudsen, 2002) and strategy as *practice* (Hendry, 2000; Jarzabkowski, 2005; Whittington, 2006). Despite the wealth of research on risk and rationality, we know too little about the actual practices associated with perceiving, evaluating, and managing risk as part of entrepreneurial and managerial processes. For the most part, our research on rationality informs—normatively and descriptively—decision making for problems with well-defined, probabilistic states. It neglects the entrepreneurial and managerial *actions* surrounding such decisions (such as problem definition, computation of probabilities, seeking to alter the choice set, and attempts to control subsequent outcomes). Furthermore, by focusing on rationality in the context of recognized opportunities, our research on risk and rationality to date has largely neglected the cases of opportunity discovery and opportunity creation and the unique rationalities entrepreneurs express in each. Researchers who take all three entrepreneurial processes into consideration will approach risk and rationality from a much broader perspective than that expressed in most prior research.

Finally, research on risk and rationality should expand beyond an individualistic orientation that examines entrepreneurs as if they were isolated, rather than embedded within social contexts. The common orientation toward studying individuals in research on risk and rationality reflects the influences of psychology and behavioral decision theory and, more distantly, the Enlightenment legacy of individualism in western philosophy and culture. Applications of network theory in organizational and entrepreneurship studies evidence a growing awareness that entrepreneurs reside within sets of interpersonal relationships that make their activities possible (Aldrich and Zimmer, 1986; Cooper,

2002). Social networks are critical for identifying entrepreneurial opportunities and assembling the resources necessary for new ventures (Ardichvili, Cardozo, and Ray, 2003). They shape entrepreneurs' cognitive functioning (Zeki, Lubatkin, and Floyd, 2003) and are the context in which entrepreneurs seek to influence others' cognitive frames (Witt, 2000). Social networks give rise to risk and risk perceptions, and social norms that model rationality in decision making and actions. Sociocultural theorists point out the social systemic nature of risk and the social processes forming risk perceptions (see Lupton, 1999). Likewise, rationalities emerge in local social contexts, such as organizations and communities of practice. The social origin of risk and rationality presents opportunities for theory building based on a view of individuals as participants in dynamic systems and engaging in social learning processes.

Relatedly, we need to investigate how organizational contexts influence risk perceptions and responses in entrepreneurial processes. Management research based on prospect theory has been criticized for simply transferring a theory of individuals' responses to risky choices to the organizational level (Sinha, 1994). Risk research based on Cyert and March's (1963) behavioral theory of the firm (e.g., Bromiley, 1991) posits organization-level constructs to explain risk taking. Few risk researchers (e.g., McNamara and Bromiley, 1997) bring together the individual and organizational levels of analysis in their theorizing and empirical research. Developing a multilevel perspective on entrepreneurship in established firms calls for new models and field research explaining the dynamics of risk perceptions, norms of rationality, and actions at individual and collective levels.

Overall, this study motivates a shift in research orientation from theory development and testing revolving around a particular modernist conceptualization of risk and rationality to a pluralist conceptualization based upon an appreciation for the distinct types of processes involved in entrepreneurship. Although I framed the study as exposing and challenging the prevailing assumptions reflected in the opportunity recognition approach to risky decisions and its associated emphasis on quantification, my contentions also challenge focusing exclusively on opportunity discovery or creation processes, and their limited views of entrepreneurial risk and rationality. By acknowledging the multiple processes involved, this study provides a starting point for

broadening beyond such process-specific views of risk and rationality and, thereby, motivates theorizing about how entrepreneurs develop and express multiple rationalities in their activities. Distinguishing three types of entrepreneurial processes clarifies the background assumptions that give rise to the disparate understandings of risk and rationality in the entrepreneurship literature, as well as in organization theory and strategic management research on innovation and organizational change.

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