

Modern Theories of Entrepreneurial Behavior: A Comparison and Appraisal

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ABSTRACT. This paper compares and appraises three principal, contemporary theories of entrepreneurial decision making – neoclassical, Austrian and behavioral. We employ theory appraisal criteria made available in Fritz Machlup's (1967) celebrated article on alternative theories of the firm. The paper considers theories that treat sequences of behavior by which individual entrepreneurs reach decisions on two levels: the discovery of profit opportunities and their exploitation. We also consider how each theory characterizes the entrepreneur's decision making process by contrast with the posited behavior of other economic agents. Austrian theory is suited to explaining novel, adventurous behavior at the discovery stage. The algorithm for opportunity exploitation in both the neoclassical and Austrian approaches is a single-repertoire, optimization rule. Neoclassical theory is situated in frictionless, atomistic Walrasian markets and emphasizes mathematical tractability. Austrian and behavioral theories conceive entrepreneurial acts taking place in market processes understood as complex institutional phenomena. There are strong theoretical complementarities between Austrian and behavioral approaches; both approaches value descriptive accuracy, though the behavioralists place more weight on operational tractability. Austrians and behavioralists share an interest in heuristics; they emphasize the role of prior micro-level knowledge at the discovery stage. Therefore more collaborative research in future between Austrians and behavioralists should prove fruitful.

KEY WORDS: alertness, entrepreneurial behavior, heuristics, optimization, theory appraisal

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1. Introduction

In a now classic paper lamenting the elusiveness of the entrepreneur in formal economic analysis Baumol (1968, p. 64) was convinced that economic “theory ... fails to provide a rigorous analysis of the behavior of the entrepreneur”. Later Demsetz (1983, p. 277) maintained that the “analytical treatment” of the entrepreneur, as opposed to purely descriptive case-study work, must rely on the standard postulate of maximizing behavior, for there was no defensible alternative. Gilad (1986, p. 189) repeated the claim that economic theory “has not made any progress in the area of entrepreneurial behavior”.

In the last quarter of the 20th century, more than Baumol and Demsetz expected and more than Gilad supposed, economists together with researchers on the borders of economic analysis, behavioral science and management science, have come to offer quite different though not necessarily competing conceptualizations of entrepreneurial behavior. To be sure, research on entrepreneurship in the late 20th century has expatiated on the distinctive functions of entrepreneurs in modern, market-based economic systems (e.g. Baumol, 1993a, b). Yet precise delineation and discussion of different branches of literature on entrepreneurial behavior – including consideration of well-defined sequences of behavior by which decisions

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are supposedly reached by entrepreneurs – together with a review and an assessment of these branches, has not been undertaken. The purpose of this paper is to offer such an assessment.

We consider various attempts to characterize individual entrepreneurial acts and decisions in the broad literature of economics in which three schools of thought have commonly been distinguished: neoclassical, Austrian and behavioral. This is the first occasion in the literature in which both the key explicit and implicit assumptions about entrepreneurial behaviour have been drawn out and compared between these different schools of thought.

Theoretical points of separation or points of complementarity as the case may be, between these different schools of thought on entrepreneurial behavior have not been closely examined. There is one partial exception. Shane (2000, pp. 449–451) makes a tripartite division between neoclassical, Austrian and psychological theories; this is a highly empirical contribution that is located expressly in the Austrian tradition. Although Shane's division is an advance on previous work, the distinction between “psychological” and “Austrian” theories in the article is not fully explicated. The outline provided of “psychological” theories is deficient since, on the author's own terms, there is some overlap between Austrian and “psychological” approaches. Moreover, as we shall observe in this article, all theories of entrepreneurial behavior have psychological aspects either stated explicitly in the initial assumptions or embedded by default in the theoretical framework. The theories under review allow for entrepreneurial success or failure and they share a common definition of the entrepreneur as a gain seeking individual making coordination decisions under uncertainty.

For our purposes, at the most general level the individual entrepreneur “must be a decision maker” who constructs and, where possible, exploits opportunities to enter a new market (Blaug, 1998, p. 217). We also concur with Casson (1982, p. 23; 1987, p. 151–152) that the “entrepreneur specializes in judgmental decision making” about resource coordination and allocation in markets where the costs of information acquisition are “different for different people”. Nonetheless, the entrepreneurial decision process under consideration has for a long time remained opaque; is it,

for instance, distinguishable from the process used by other economic agents? Sections 2, 3 and 4 below discuss this issue by surveying neoclassical, Austrian and behavioral conceptualization of entrepreneurial behavior. Section 5 compares, contrasts and appraises these theories utilizing criteria made available by Machlup (1967). In Section 6 we conclude by briefly assessing the prospects for future research in this field.

2. On the neoclassical theory of entrepreneurial behavior

Since the mid-20th century neoclassical formulations of entrepreneurial behavior have been embodied in more comprehensive theories of production, of the firm in perfectly competitive market structures, or of firm formation in a competitive equilibrium context. It was sheer hyperbole for Baumol (1968, pp. 66–67) to claim that in the “neoclassical model” the “theoretical firm is entrepreneurless – the Prince of Denmark has been expunged from the discussion of Hamlet”. Baumol's position was motivated by the neoclassical conception of the entrepreneur as a functionary and as another factor of production separate from the standard triumvirate: land, labor and capital. The traditional production function describes an engineering relationship between inputs and outputs rather than a behavioral phenomenon. Entrepreneurship, like other inputs, is a deployable scarce resource. Some writers in the neoclassical tradition refer to specific entrepreneurial inputs as a type of human capital viz. “entrepreneurial ability” or “business acumen” (Evans and Jovanovic, 1989, p. 810). However as Blaug (1996, pp. 440–441) argued, “the strange disappearance of the entrepreneur from the center stage of economic theory” may be attributed to intractable analytical difficulties with the marginal product of the entrepreneurial input given its indivisibility and its nonstandardized, heterogeneous character. Since Walras's contribution in the late 19th century an overarching conception of end-state equilibrium has circumscribed the notion of the neoclassical entrepreneur as a decision maker within the ‘firm as production function’ approach. In a world of uncertainty (understood as calculable risk), and given the entrepreneur's decisions take place with optimally

imperfect information (following Stigler 1961), a theory of profit has been appended to the neoclassical model of the firm as a production function that sustains a minimalist entrepreneurial role. Entrepreneurs are only distinguished from other factor inputs by assuming they act as residual profit claimants given their special risk-bearing appetite (Blaug, 1996, p. 444). Risk adverse agents remaining in the firm are designated as administrators, employees or laborers.

In sophisticated models in the neoclassical tradition, such as the Khilstrom and Laffont (1979, p. 720) general equilibrium model of firm formation, entrepreneurs contribute managerial and organizational skills ("entrepreneurial ability"). Unlike risk averse laborers, entrepreneurs bear the risks associated with production. We now list concisely those features of this neoclassical approach that have implications for the behavior of entrepreneurs.¹

1. Entrepreneurs have equal access to the same risky ideas or technology and receive all the profits of risk-taking.
2. All entrepreneurs are risk neutral, so that a unit of entrepreneurial labor is homogeneous in respect of risk attitude.
3. While entrepreneurial labor inputs are deployable they are not deployable in infinitesimal amounts.
4. Entrepreneurs are the firm's principal decision makers and enjoy free entry to the industry concerned.
5. Since risk attitude is potentially affected by firm size, the model's range of applicability is to entrepreneurial behavior in "small businesses and farms" (Khilstrom and Laffont, 1979, p. 749); in short it is restricted to an atomistically competitive economy.
6. Entrepreneurs are always and everywhere maximizers (or optimizers in that they may act as cost minimizers as well).

In elaborating on the dynamics of firm entry and exit the neoclassical approach identifies an equilibrium outcome. When an inefficient equilibrium outcome is investigated "it takes three forms: risks are maldistributed, firms are operated at the wrong levels and there is an inappropriate number of firms" (ibid: 721). Institutional impediments

such as a dearth of risk-sharing opportunities can lead to an inefficient allocation of risks. Stock market institutions and venture capital financing arrangements are not incorporated in these models. Crucially, the referents used for theory construction and evaluation is the existence, stability and efficiency of competitive equilibrium. It is against these outcomes that the neoclassical theory of entrepreneurial decision making must be judged.

Khilstrom and Laffont (1979, p. 720) explicitly address entrepreneurs' decision styles, a matter taken for granted in most other work in the neoclassical tradition where individual behavior is set in the form of "expected utility maximizing". By this postulate, it is proposed that the entrepreneur will maximize the subjective expected utility of profits derived from risk bearing. Moreover, neoclassical entrepreneurs obey the standard von Neuman-Morgenstern axioms of decision-making under uncertainty (preference completeness, consistency, independence). They are idealized, representative entrepreneurs rather than real entrepreneurs, just as the firms in which they behave are hypothetical and representative. And entrepreneurs have a systematic response to uncertainty, use probabilistic calculating procedures, can easily be turned into good Bayesian learners and act comfortably in strategic decision making contexts by calculating their actions according to their competitors' possibilities (Laville, 2000b, p. 421). Whatever nuance may have been appended to the model in the later 20th century there is no escaping Baumol's (1968, p.68) original observation that neoclassical entrepreneurs are "automaton maximizers" and automaton maximizers they have remained.²

Some specific (often tacit) neoclassical behavioral assumptions in respect of entrepreneurial behavior have not hitherto been widely appreciated in the literature. An entrepreneur:

7. lists all alternative opportunities for allocating resources in an equilibrating manner in existing markets;
8. finds opportunities evenly (randomly) distributed in the market and these have the same value for all who search for them;
9. determines all the possible consequences of acting upon an opportunity;

10. makes comprehensive comparative evaluations of each set of consequences and selects between different opportunities and
11. has access to information required initially to perceive alternative opportunities and their consequences, though the standard marginalist tools are applied to information as with other commodities.

As a result of applying (7) through (11), entrepreneurs will arrive at optimally imperfect decisions when considering whether or not to exploit a profit opportunity which reveals itself as a marked divergence between revenue and costs in market disequilibrium states. There is nothing in the five foregoing implications suggesting that what has been constructed is a separate theory of the entrepreneurial decision process in which opportunities are generated and then exploited, not to mention a theory that may directly be tested empirically. It is one thing to postulate a certain human decision algorithm within a firm situated in a competitive equilibrium context, and quite another to assume that entrepreneurial decisions, as an empirical matter, are coordinated in an equilibrium pattern. Neoclassical entrepreneurial behavior is differentiated from the behavior of consumers and laborers: entrepreneurs are a class of agents with a stable attitude to risk. All individuals in this class are equally and instantly capable of exploiting known profit opportunities. In an important sense not only is instantaneity asserted; the entrepreneurial class is always preserved in neoclassical models. No particular individual stands out.

The idealized decision processes of entrepreneurs are imagined to be exactly the same as the other maximizing agents and the theory of optimization establishes precisely what objective function is to be computed. While the neoclassical treatment of the costs of information search, information acquisition and opportunity identification is just another application of marginalist analysis, the burden of computation itself is usually set aside (Conlisk 1996, pp. 686–690; Mongin and Walliser, 1988). So, too, is “the question of why maximizing ... is the appropriate computation” (Laville, 2000a, p. 127); it is a question which is never posed in the limited, modern neoclassical literature on entrepreneurship. This should be scarcely surprising given the cameo role played by

entrepreneurial behavior in the general equilibrium theory of firm formation.

3. Austrian explanations of entrepreneurial behavior

Since von Mises (1949) and later extensions by Kirzner (1973, 1979, 1997), modern Austrian explanations have been sharply differentiated from the neoclassical approach. Originally von Mises (1949, p. 253) proposed that entrepreneurs were not part of a homogeneous class of deployable inputs and entrepreneurial action was an all-pervasive potentiality in all market participants. Entrepreneurs seek opportunities for gainful exchange over time; they are not conceived as part of a unique class of risk bearers distinguishable from laborers, consumers or managers. It is the entrepreneurial act that is distinctive – an act involving the purposeful pursuit of opportunities Kirzner (1973) was later to dub ‘alertness’.

From von Mises’s work onwards in the Austrian tradition, perennial optimality in competitive markets is not assumed at the outset. In an oblique remark directed at standard neoclassical models incorporating entrepreneurial behavior, Kirzner (1999, p. 4) railed against theories which require that “every opportunity for mutually net-beneficial exchange between each and every pair of individuals must be taken advantage of at the very instant where such an opportunity emerges into existence” (emphasis in the original; see also Kirzner, 1997, p. 45). For Kirzner, the attainment of market equilibrium requires entrepreneurial action. Theorizing about competitive market processes leading to equilibrium provides fertile ground for building a theory of entrepreneurial behavior by contrast with theories about the behavior of other agents in the economy such as consumers. The market process is said to be “driven” by entrepreneurs “alert” to unnoticed, unexploited gains from exchange. Alertness “refers to an attitude of receptiveness” or preparedness to recognise existing, overlooked opportunities; it also implicitly contains a propensity to coordinate resources used in market processes (Kirzner, 1997, p. 12; also Kaish and Gilad, 1991, p. 48). Following the many contributions of Israel Kirzner we may characterize profit opportunities that form the subject matter

of entrepreneurs' problem situations as follows. Profit opportunities are:

1. latent in, or created by existing market circumstances;
2. not all discovered and exploited instantly;
3. not likely to be recognized by all entrepreneurs even if they are furnished with the same market information;
4. sometimes known to particular entrepreneurs and not others due to information dispersion in markets and to localized, tacit knowledge which is not always directly communicable;
5. non-deliberately or spontaneously discovered though not normally as a complete set (*à la* neoclassical models);
6. not known probabilistically before entrepreneurs start their discovery (search) process;
7. not all forthcoming as a result of finely calibrated, mechanical, optimizing search though they may be found as a result of coordination errors committed by other entrepreneurs (the information content of existing relative prices is vital here);
8. not discovered simply as a result of pure luck but by activating the ubiquitous attribute of alertness;
9. only opportunities if they are in fact exploited;³
10. gradually eliminated by individuals who "switch on" their alertness save that errors in the face of exogenously created new opportunities provide "continual interference" to this trend (Kirzner 1997, p. 71; 1999, p. 6) and
11. discovered (under 4 above) and subsequently exploited by entrepreneurs in an optimizing fashion (Kirzner 1995, p. 107).

In respect of the nature of behavioral activity undertaken by the Kirznerian entrepreneur at the opportunity exploitation stage it is notable from the above list (point 11) that optimizing is central. Kirzner (1995) is careful to reserve non-deliberativeness for the discovery stage (points 5–8) where mechanical computation seems inappropriate because all possible existing opportunities in the market cannot be perceived at once, calculated over or selected among. In other words, purposefully establishing the means and ends of entrepreneurial behavior – often in an iterative feedback

process – is a prerequisite for eventual maximizing behavior. In Austrian theorizing alertness is critical because a pre-ordained means-ends framework (where the 'ends' are available profit opportunity sets) does not function as an initial postulate. The Austrians establish preconditions for maximizing behavior. Whether maximizing takes place at all in the opportunity discovery stage is unimportant for Austrians since, usually, discovery is a "routine-resisting" behavior (Kirzner, 1997, p. 71). The Austrian tradition is not monolithic when it comes to the matter of opportunity exploitation; exploitation could follow a maximizing rule (as Kirzner insists it should) or other decision routines, conventions or heuristics. All these responses are apparently compatible with the operation of entrepreneurial alertness. For example, O'Driscoll and Rizzo (1986, p. 256) conclude: "[e]ntrepreneurial alertness . . . may be the source of the perception of an opportunity, but rule following may be the only feasible way of exploiting it in an uncertain world". Yet rule following precisely by whom – a hypothetical individual? We turn next to one of the implicit judgments Austrians make about theory construction. For these theorists descriptive accuracy is conferred a higher ranking than robust, formal, parsimonious modeling.

Austrians adhere to the principle of reducing market aggregates and outcomes to the individual decisions that cause them, the Austrians stand out for reducing their theoretical statements to individual action in market contexts rather than to slightly aggregated organizations or firms (which may act 'as if' they were individuals). At first glance, this Austrian reduction would appear innocuous. Not up until very recently in a contribution by Kirzner (1997) have the theoretical objectives of the Austrian approach been fully explicated. Kirzner explains that

Austrian theory is able to recognise the speculative element in all individual decision making, and to incorporate the activity of the real world business man into a theoretical framework that provides understanding of the market process (69–70, emphasis added).

Immediately it should be noticed that Kirzner's theoretical purpose is to conceive of the behavior of real entrepreneurs. Further, consistent with our presentation so far, Kirzner submits that Austrian theorizing "diverges sharply from the

notion of individual decisions that constitutes the building block of neoclassical microtheory” (ibid: 70). For the individual decision maker is now bifurcated: there is behavior associated with opportunity discovery (or recognition) and behavior associated with opportunity exploitation (or pursuit). And it is only when theorizing about behavior in the discovery realm that Austrians claim to have forged a unique contribution.

The objective is to consider the nature, existence and exploitation of profit opportunities in real market contexts with a view to offering a more empirically grounded perspective on entrepreneurial behavior. This orientation has given rise to studies of arbitrage, innovation and speculation as species of the Austrian entrepreneurial discovery process (Harper, 1994, 1996, 1998; Harper and Earl, 1996). The contextual or situational elements associated with entrepreneurial alertness are often represented as unique and have given rise to a range of widely different empirical investigations linked to the Austrian tradition.⁴

From the foregoing exposition of the Austrian perspective, alertness – that capacity to recognise unexploited opportunities – has not been, and indeed cannot be, presented as a theory of decision making. Firstly, alertness is an asserted behavioral mode. Secondly, it functions in theorizing as a metaphor indicating an aspect of behavior. The entrepreneurial ‘aspect’ is a decision making process beginning with “shrewd and wise assessment of realities (both present and future)” (Kirzner, 1980, p. 7). Thirdly, ‘alertness’ as a psychological phenomenon begs many questions that might be posed at the interface of economics and other behavioral sciences (Gilad, 1986, pp. 195–198; Gaglio, 1997a, pp. 164–169). Alertness is part of the very core structure of Austrian theory – an asserted ability to notice gainful opportunities in the market without deliberate, planned search. We suggest that the alertness assumption be specified in two parts: (i) entrepreneurs are alert individuals (unlike other market participants they unwittingly possess a “gift” (Kirzner, 1979, p. 148)) with a capacity not to overlook existing opportunities and (ii) entrepreneurial alertness is activated by price signals of potential gain at the microlevel (in a specific temporal and local situation where

market pricing prevails). If alertness is employed by the theorist as a core axiom about entrepreneurial behavior it does not require direct testing. It is applicable only in the disequilibrium market process and is neither necessary nor sufficient to generate propositions about market equilibrium. The Austrian entrepreneur, at least in the opportunity discovery realm, is crafted as part of a vision of the continuity of the market process.

4. Behavioral theories of entrepreneurial decision making

Literature in the behavioral field, even on the specific subject of the entrepreneur, is vast.⁵ We wish to find common elements in a range of modern approaches to individual decisions that have applications either explicitly made, or indirectly indicated, to entrepreneurs. We are interested in research on entrepreneurial behavior which “is preceded and determined by some form of cognitive information processing which serves as an intervening variable between changes in circumstances and behavior” (Earl, 1990, p. 925). Modern behavioral theories offer alternative conceptualizations of profit opportunity identification. Decision heuristics form the centerpiece of behavioral research on choice in general and individual entrepreneurial behavior in particular.

While Herbert Simon has not discussed entrepreneurial behavior at great length, his work from the late 1950s emphasized cognitive limitations of decision makers: both limitations on knowledge and computational capacity have applications to entrepreneurship.⁶ Simon (1958, p. 393) argued that economic theory must address “situations where the alternatives of choice are not given in advance, but must be discovered; where the means-ends connection between choices and consequences are imperfectly known.” Whether it is a problem of discovery or selection among alternatives already discovered, “only in exceptional cases” is human decision making concerned with discovery and selection of “optimal alternatives” (March and Simon, 1958, pp. 140–141). At the discovery stage constraints external to the decision maker are pre-eminent. A fully known, fixed set of existing profit-making opportunities is not available in most complex market circumstances – not even potentially available. This should not be

taken to mean that “searching for possible courses of action” and the “lengthy and crucial process of generating alternatives” should be left out-of-account (Simon, 1987, pp. 726–727); it is only that the computational complexities are too great for entrepreneurs to generate the most profitable opportunities from an exhaustive set. Only better opportunities than have been previously available, or aspired to, become relevant and part of the ambit of the decision which is embedded in a unique, ever-changing situation. There is one exception. At the post-discovery stage a postulate which posits maximum subjective expected utility (or profit) implies that decision makers have complete knowledge of probability distributions for estimating the consequences of decisions executed over discovered opportunities. More usually, an internal cognitive constraint, a human inability to fully compute, is posited by behavioralists. This postulate functions in a more substantive way than merely specifying an information constraint. The decision maker is nevertheless ‘idealized’ and representative in a very special sense. The representative entrepreneur in behavioral theory is considered to have “an ordinary human mind” (Simon, 1987, p. 267). On average the entrepreneur’s mode of calculation and of behavior in general is bounded by a cognitive capability different from, through not necessarily inferior to, an optimizing entrepreneur.⁷

As in previous sections we enumerate key dimensions of the theory under review. Entrepreneurs’ profit opportunities:

1. are not straightforwardly and objectively representable – they must be distinguished from entrepreneurs’ perception or construction of them (so that the attributes of a failed or successful entrepreneurial decision process can be analyzed by an observer). As Simon (1986, p. S211) averred:
if we accept the proposition that both the knowledge and computational power of the decision maker are severely limited, then we must distinguish between the real world and the actor’s perception of it and reasoning about it”;
2. are generated by boundedly rational individuals using heuristics;

3. are deliberated upon in a non optimizing serial cognitive process involving mental construction both of the opportunities and aspiration levels associated with them;⁸
4. normally appear to the entrepreneur in complex, uncertain, rapidly changing environments;
5. are never available in an exhaustive set – some may remain to be generated or constructed;
6. are exploited using heuristic strategies that give scant clues on what outcomes would have been forthcoming if a different heuristic had been employed and
7. are usually exploited (a) in unique environments or (b) in opaque, highly variable environments that render learning (i.e. feedback between situation and response) difficult.

Crucial for understanding theory construction in the behavioral tradition is the axiomatic status of points 2 and 3 above. The behavioralists, following Simon, take as core, untestable propositions, that entrepreneurs are non optimizers who use heuristics (such as satisficing strategies) which violate the standard von Neumann–Morgenstern axioms. The behavioral model has one clear purpose: to open the way for a wide range of empirical studies of actual entrepreneurial behavior. Behavioral research has used the seven dimensions above in varying degrees to direct empirical work and draw generalizations about typical entrepreneurs.

Let us illustrate how the behavioral approach has thus far researched the exploitation of profit opportunities. Behavioralists have demonstrated that entrepreneurs construct mental representations of market opportunities that had not occurred to other market participants. More crucially entrepreneurs may in fact create riskiness: “they turn the commonplace into the unique and unexpected”(Mitton, 1989, p. 12). Once constructed, the opportunity is exploited with less than the normally expected caution and risk is perceived rather differently from the way it is assessed by the neoclassical entrepreneur. First, there is a strong tendency to see the opportunity as unique in that no other person will possess all the specialized market information a particular

entrepreneur will hold. Second, the possibility of updating riskiness ('learning') is discounted because it is usually considered that the decision situation will not be repeated or replicated. Third, as a consequence of the foregoing factors entrepreneurs are susceptible to a decision 'bias' though behavioralists accept the phenomenon as typical. In empirical studies of highly competitive market situations, entrepreneurs exude optimism in their self-assessments without referring to base rates for success in similar enterprises (Cooper et al, 1988; Camerer and Lovo, 1999). As well, the attraction of chosen opportunities tends to be exaggerated; information about them is consistently framed more positively than it would be by non-entrepreneurs (Palich and Bagby, 1992, p. 113). Entrepreneurs also overgeneralize from limited information and small or non random samples such as limited personal experience and specialized prior knowledge (Shane, 2000). In the absence of these 'biases' many entrepreneurial actions would never have occurred (Busenitz and Barney, 1997, p. 10).⁹

The list of conjectured and confirmed operations used by entrepreneurs to evaluate gainful opportunities can include a repertoire of actions or rules behavioralists have classified as "cognitive heuristics" – availability, representativeness and anchoring.¹⁰ Heuristics are used as simplifying mechanisms in complex situations without which many entrepreneurial actions would be paralyzed (Manimala, 1992). As guides to actual entrepreneurial behavior in materially different situations these empirical findings seem unexceptionable.

Instead of assuming that gainful opportunities exist in markets and are awaiting discovery, some behaviorally oriented research has taken the position that opportunities are originated endogenously. Entrepreneurs build mental constructs or theories of their situations and then act on them; they are likened to scientists who generate testable hypotheses from theories. Individual experiences are mediated through a personal mental construct which acts as an interpretative framework and then a range of conceivable methodologies are used in the evaluation process (Harper, 1996; Harper and Earl, 1996; Loasby, 1983; Woods, 2002). In addition, behavioralists see opportunity evaluation as a circumscribed process. For instance, the

availability heuristic may be employed in which the merits of a discovered opportunity (e.g. a higher potential value) are tested against other known opportunities over a narrow personal domain; opportunities being exploited by entrepreneurs in other diverse domains are ignored possibly because their dimensions are difficult to construct mentally and then contemplate.¹¹

Generally, a behavioral theory of entrepreneurial behavior starts with questions about an entrepreneur's modes of reasoning through the complete process of opportunity construction, exploitation and interpretation of results. Most of the seven key dimensions of the approach set out earlier form the basis for informal theory-building in this tradition. That entrepreneurs have recourse to heuristics is both a starting point and a corroborated conclusion in behavioral work. The problem for those wishing to develop operational theories of entrepreneurial behavior is not so much one of accounting for risk attitudes, or seeking to formalize how entrepreneurs make subjective probability estimates of future outcomes from decisions to exploit opportunities. Encapsulating the variety of heuristics guiding behavior would lead fruitfully to analyzing the relative effectiveness of different types of behavior in real cases. Modes of opportunity exploitation depend on a wide variety of institutional factors too numerous to recount here (see Shane and Venkataraman, 2000, p. 10–11).

A single, overarching, formal theory has thus far eluded behavioralists though Simon's supposition of boundedness forms a core concept. Some questions yet to be integrated into work specifically on entrepreneurs include: what constitutes an effective entrepreneurial decision making procedure – is there a single procedure or a multitude of them? How do computational capabilities and heuristics evolve among entrepreneurs? Does market competition eliminate heuristics and enforce a return to habitual optimization?¹² These questions would not occur to those who conflate the costs of computation and boundedness with other decision constraints.

Behavioralists can claim to have produced descriptively accurate accounts or less formal theories viewed as a series of interconnected generalizations that are observationally or case study driven. Results so far are encouraging if building

empirical content is considered a desirable criterion of good science. Indubitably, it is now possible to classify a range of typical decision procedures used by entrepreneurs. The problem of explaining the heterogeneity and versatility of entrepreneurial actions has been rendered more tractable than it might have been some 30 years ago. Entrepreneurs' behavior is not nearly so incoherent when decision contexts vary as might have been supposed.

5. Theory comparison and appraisal

The neoclassical, Austrian and behavioral approaches possess fundamentally different features. In order to compare and contrast these approaches it is useful to employ a method of theory assessment made available by Machlup (1967) in a celebrated article with a purpose similar to our own: "Theories of the Firm: Marginalist, Behavioral and Managerial" (Machlup 1967). Like Machlup we wish to compare three major traditions in recent literature with a view to assessing the applicability and delimiting the usefulness of different theories (in this case, of entrepreneurial behavior). According to Machlup (1967, p. 8-9) three pitfalls in theory appraisal must be avoided:

1. *Confusion of purposes.* It is only acceptable to reject models if they are "not equipped to answer" questions for which they have been designed.
2. *Mistaking the function of postulates.* For example, postulates about entrepreneurship and entrepreneurial behavior usually form part of a network of logical connections in an all-embracing theory. That is, their precise function in a logical formulation must be understood.
3. *Misplaced concreteness.* There are dangers in falling prey to the fallacy of "misplaced concreteness" when assessing the strengths and weaknesses of a particular approach. That is, for the three models considered in this article we could not expect that the proponents adopt the same methodological preconceptions so that their theorizing is standardized and pitched at identical levels of abstraction of formalization. As a corollary, it is not obvious that theoretical symbols in all models

"must have a directly observable concrete meaning" (1967, p. 9).¹³ Those symbols may perform other functions. We considered different conceptualizations of entrepreneurial behavior making due allowance for the fact that the degree of intended formalization is not uniform across the three traditions of theorizing under review.

As an example of (3) above, we have been mindful of a parallel danger for those undertaking comparative research of the kind prosecuted here: it is unacceptable to overlook differences in the substantive content of identical or similar terminology used in different theories. Terms used in opposing theories may bear superficial resemblances only. For example, the unit of analysis in neoclassical, Austrian and behavioral theories of entrepreneurial behavior is not, on our examination, exactly the same even though all refer to individual entrepreneurs. Rather than a team, firm or organization, the entrepreneur in each theory is considered a decision making individual. Individual decisions are not analyzed uniformly with a view to predicting or explaining the behavior of aggregates such as large numbers of individuals, firms, or market-level price-quantity outcomes. While one theoretical tradition, namely the neoclassical approach relies on the conjectured behavior of a representative, hypothetical entrepreneur, the behavioral approach wishes to generate hypotheses and offer explanations for the actions or decisions of an actual, individual entrepreneur. Here the substantive content of the concept 'individual entrepreneur' diverges.

In the neoclassical approach no claims are made for real case applicability. Following our Machlupian method of theory appraisal, criticisms leveled at such models are only valid if they refer to internal logical coherence – incompleteness or inconsistency. Criticisms of the assumptions will be misdirected and have no bearing on the general theoretical purpose of the model in which the entrepreneur's maximizing behavior facilitates the design of formal equilibrium models of firm formation. What matters to the neoclassical theorist is thorough incorporation of the von Neuman–Morgenstern choice axioms in a theoretical framework that correctly reasons toward a stable, efficient equilibrium

outcome at the level of the market as a whole. Within this tightly circumscribed domain, entrepreneurial behavior considered as maximizing under uncertainty forms an auxiliary link helping to explain the effects of particular classes of conditions, or the effects of the absence of particular conditions (such as risk maldistribution), on equilibrium outcomes.¹⁴ And the core behavioral assumption (optimizing) cannot be tested independently against standards and purposes not germane to the neoclassical model.

By contrast, there is no presumption in Austrian studies that entrepreneurial behavior must be considered as part of analysis of market equilibrium end-states and the determinants of those states. In this the Austrians have posited a theoretical referent for all work on entrepreneurship different from neoclassical approaches. They are interested in explaining and understanding features of market process that only tend in an "equilibrative direction" (Kirzner, 1997, p. 73; 1999, pp. 7–8). Also the Austrian unit of analysis is different. Competitive market processes can only be properly understood by reducing the level of abstraction from that which would obtain in more deterministic neoclassical treatments. In this view, it is essential to theorize about essential, contextual, time-and-place contingencies where profit opportunities appear. Mostly literary Austrian explanations therefore have an utterly different character from neoclassical theorizing on entrepreneurs. The Austrian perspective attempts to understand entrepreneurial behavior at another level that is incommensurable with the neoclassical preoccupation turning on prediction from formal models.

The contrast between each theory in respect of the different treatment of entrepreneurs as opposed to non-entrepreneurs is summarized in Table I.

Table I illustrates that the fundamental difference between behaviorally inspired theory and the neoclassical and Austrian approaches turn on the behavioralists' focus on decision heuristics and the framing of these heuristics in different contexts where entrepreneurs are active. Heuristics are molded out of unique situations and entrepreneurs may be expected to behave differently from non-entrepreneurs precisely in the way they frame a decision. For behavioralists, cognitive limitations are a common feature of all human behavior and framing is a constituent activity of decision making in general (Kahnemann, 2000). Neoclassical theorists and Austrians (particularly those following Kirzner's contributions) reject heuristics because they imply systematic 'errors' or 'biases' which are inconsistent with the rational economizing entrepreneur who weighs up the value of profit opportunities against their costs and ultimately chooses the one with highest subjective expected value. To be sure, the Austrian perspective is differentiated by its emphasis on the role of spontaneous, non-deliberative acts at the discovery stage.

Table II contains a comparative depiction of various dimensions of each theory classified according to the theory appraisal criteria we have distilled above from Machlup.

As Machlup observed, the objectives of theorizing should not be confused. Each theory of entrepreneurial behavior outlined here has assumed a different purpose, though the Austrian

TABLE I
Entrepreneurs versus Non-Entrepreneurs

Theory	Does the entrepreneur's behavior differ?	
	Opportunity discovery and construction	Opportunity exploitation
Neoclassical	Yes: fully deliberative optimizer more favorable to risk	No: optimally allocates means to ends
Austrian	Yes: non-deliberative with gift of alertness	No: optimally allocates means to ends
Behavioral	No: limited, deliberative satisficer though context specific cognitive constraints generate opportunities	Yes: employs context specific heuristics

TABLE II
Dimensions of theory construction and application

Theory of entrepreneurial behavior	Purposes of theorizing	Role of postulate concerning entrepreneurial behavior	Legitimate application of theory	Common errors in use of theory
Neoclassical	Parsimony Formal representation Mathematical tractability	Creates typical maximizing class of risk bearers	Explains firm formation in competitive equilibrium. Prediction of market-level outcomes. Prescribes optimization in atomistically competitive contexts	Assimilating cognitive limitations. Invalidating role of cognitive limitations
Austrian	Descriptive accuracy	Creates alert individual with discovery potential	Understanding opportunity discovery in market process. Predicting entrepreneurial action when opportunity exploitation has recourse to optimization	Denying role for cognitive limitations in opportunity exploitation. Predicting convergence to market equilibrium
Behavioral	Descriptive accuracy. Behavioral realism. Operational tractability.	Creates typical decision maker with limits on cognitive capacity	Investigates impact of cognitive limitations. Explains creation of heuristics in complex, changing contexts. Provides direction for case studies and surveys	Misplaced concreteness: criticizing unrealisticness of optimization assumption in other theories?

and behavioral approaches overlap and are more compatible on this score. By contrast, neoclassical theory has a different theoretical referent, namely generating the determinants of competitive equilibrium end-states; accordingly the individual entrepreneur is incorporated in a class of agents playing a special role in firm formation. The limited usefulness of the optimization hypothesis is underscored in Table II. As behavioralists have argued, it could well be replaced by a less demanding hypothesis, such as deliberate satisficing about entrepreneurial behavior without loss of explicative power.

Austrian theory seems well suited to explaining novel behavior, particularly the speculative element so evident in the discovery of profit opportunities. In terms of the algorithm used for opportunity exploitation, the Austrian and neoclassical theories offer a one-dimensional, single-repertoire behavior (i.e. optimizing). Neoclassicalists legitimately apply their theory in atomistic, Walrasian, market-clearing environments whereas Austrians and behavioralists situate entrepreneurs in changing market processes where the market is considered a complex institutional phenomenon. For the Austrians complexity gives rise to unperceived, gainful opportunities carrying potential for discovery by

alert entrepreneurs. For the behavioralists, complexity increases entrepreneurs' reliance on a plenitude of heuristics resulting in the transformation of risk perceptions and the endogenous construction of opportunities.

In the development of the literature so far, the spontaneous creation of entrepreneurs' frames leading to opportunity discovery has been accommodated more comfortably in Austrian economics, specifically in Kirzner's extensive contributions. Unlike behavioralists, Kirzner does not elaborate on the precise reasoning procedures adopted by entrepreneurs in the discovery process. Nevertheless, of significance in our delineation of the purposes underwriting theories of entrepreneurial behavior in Table II are the remarkable complementarities between the Austrians and behavioralists over the need to build descriptively accurate, therefore less formal, theories. Of course, behavioralists wish to advance further by incorporating heuristics in a more realistic conception of the entrepreneur as a decision maker; they wish to confer on the entrepreneur less demanding cognitive powers (than optimization) in data-driven theory. As far as applications of each theory are concerned, attempts to assimilate cognitive limitations into neoclassical or Austrian theory have not been effective. The tendency

for behavioralists especially to criticize the neo-classical model for their unrealistic depiction of entrepreneurial behavior commits what Machlup called the fallacy of misplaced concreteness. Behavioral theory cannot act as an effective critique of optimizing behavior. Instead behavioralists should celebrate the fact that their theorizing has demonstrated considerable fertility in explaining entrepreneurs' behavior: it has generated many case study applications and directed widespread survey work while the results have had multidisciplinary implications.

6. Conclusion

In the final analysis, differences in the interests of those working in the three theoretical traditions discussed in this paper do not rest on alternative methods for contemplating 'facts' about the process or outcomes of entrepreneurial behavior. Dominant theoretical objectives and referents are critical differentiating aspects in determining what constitutes good research within each tradition. There is at present no emerging possibility of an all-encompassing, single theory of entrepreneurial behavior that could make the three approaches commensurable. This conclusion notwithstanding, we have demonstrated that the Austrians and behavioralists start with a common purpose for theoretical work in the field and their subsequent contributions enjoy complementarities not yet fully recognized.

The Austrian notion of alertness incorporates a theory concerning the construction of profit opportunities confined to a specific field of the entrepreneur's vision in which the entrepreneur is distracted from attending to other fields. Just as there must be diverse ways of conceptualising the state of being alert in the real market processes, so too are there assumed to be different ways of framing, setting aspiration levels etc., in behavioral research on entrepreneurs. It is here that future collaboration between Austrians and behavioralists would be fruitful. They need to reconcile their concepts as we have endeavoured to do in this article, provide a common language for theorizing about entrepreneurial behavior and then conduct appropriate empirical work.

Notes

¹ We draw heavily on the following sources for this material: Evans and Jovanovic (1989), Kanbur (1979), Khilstrom and Laffont (1979) and Ronen (1983).

² Teece and Winter (1984, p. 119) summarize all this by concluding that "neoclassical models" reduce entrepreneurial "decision making to the mechanical application of mathematical roles for optimization".

³ Thus Shane (2000, p. 450) "Austrian economics considers opportunity exploitation to be endogenous to opportunity discovery". See also Gaglio (1997a, pp. 161–163).

⁴ See for example Kaish and Gilad (1991), Gaglio (1997a, pp. 170–191; 1997b), Gaglio and Katz (2001), Shane (2000), Woods (2002). For a recent model inspired by Austrian ideas and constructed with clear operational suggestions see Minniti and Bygrave (2001).

⁵ In this literature, entrepreneurial behavior has been differentiated from organizational behavior (Gartner et al., 1992); managerial behavior (Busenitz and Barney, 1997) and bankers' behavior (Sarasvathy et al., 1998).

⁶ This and the following paragraph draw heavily on Simon (1958, 1986, 1987).

⁷ Bounded cognitive capacity has been likened to an elephant in the living room – impossible to ignore (Conlisk, 1996, p. 691). Behavioralists do not see the elephant as a handicap; in their research on entrepreneurial behavior they have sought more accurate depictions of subsequent activities in the living room.

⁸ As for the origins of these aspirations levels and changes in them see Simon (1958). It has been noted that modern behavioral literature on "framing effects" is "consistent with the conception of bounded rationality originally presented by Herbert Simon". (Tversky and Kahnemann 1986, pp. S272–S273). For criticisms of the aspiration level concept see Bianchi (1990, pp. 160–161) and Thomsen (1992, pp. 70–71).

⁹ Optimism serves "to convince other potential stakeholders (such as investors, suppliers, customers, key employees) of the opportunity that affords them if they get in on the ground floor of the venture. Put differently, if entrepreneurs wait until all the "facts" are in to start convincing others that their venture is indeed legitimate, the opportunity they are seeking to exploit will most likely be gone by the time more complete data becomes available" (ibid: 15). Or as Richardson (1960, p. 57) wryly observed: "a general profit opportunity which is both known to everyone and equally capable of being exploited by everyone is ... a profit opportunity for no one in particular".

¹⁰ Shaver and Scott (1991, p. 33) provide an illustration of each: "A person who just read about another restaurant's closing in the morning will give a higher estimate of failures than will a person who has not seen such a story in a long time (the availability heuristic). A person for whom Restaurant X is typical of successful establishments will make a lower guess about failure than will a person for whom the Restaurant X resembles failures (the representativeness heuristic). Finally, a perceiver who knows that three local restaurants have failed will make a smaller estimate than a perceiver who has been told that 10,000 restaurants have failed nationally (the anchoring heuristic)."

¹¹ As recommended by Simon (1978, p. 503), a positive theory of behavior in “complex tasks” situations can only be constructed by accounting for “the fact that the human information processor operates serially, being capable of dealing with only one of a few things at a time”.

¹² Rabin (2002, pp. 678–679) is surely right to complain that even if some heuristics are “wiped out” by competition, there are still good reasons to take account of behavioral phenomena in theoretical work. For it all depends on how institutional contingencies are configured. Only in a frictionless, atomistic Walrasian market must perennial optimization apply. Behavioral researchers are endeavoring to theorize about behavior in persistently non-Walrasian situations.

¹³ Machlup uses the example of the “household” in neoclassical price theory. “The ‘household’ in price theory is not an object of study; it serves only as a theoretical link between changes in prices and changes in labor services supplied and in consumer goods demanded. The hypothetical reactions of an imaginary decision-maker on the basis of assumed, internally consistent preference functions serve as the simplest and heuristically satisfactory explanation of empirical relationships between changes in prices and changes in quantities. In other words, the household in price theory is not an object of study.” (1967, p. 9)

¹⁴ Thus Machlup (1967, p. 9): “we ought not to confuse the explanans with the explanandum”. On methodological issues, especially misguided criticisms of the neoclassical maximization postulate see Boland (1981) and Laville’s (2000b) important response.

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