

Outlines of a behavioral theory of the entrepreneurial firm

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Abstract

In *A Behavioral Theory of the Firm* (BTF), Cyert and March [Cyert, R.M., March, J.G., 1963. *A Behavioral Theory of the Firm*. Prentice-Hall, Englewood Cliffs, NJ] present a clutch of ideas for explaining the behavior of established firms within an environment of well-defined markets, stakeholder relationships, technologies, and so on. In this paper, we outline a behavioral theory of the *entrepreneurial* firm that emphasizes *transforming* environments rather than acting within extant ones. In particular, we explicate three ideas that parallel key concepts in BTF: (1) accumulating stakeholder commitments under goal ambiguity (in line with a political conception of goals), (2) achieving control (as opposed to managing expectations) through non-predictive strategies, and (3) predominately exaptive (rather than adaptive) orientation.

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1. Introduction

Modern perspectives on the firm often rely, implicitly or explicitly, on behavioral ideas from Cyert and March's (1963) *A Behavioral Theory of the Firm* (BTF). Their ideas about goal conflict, behavioral conceptions of information search and expectation formulation, and the adaptive adjustment of choice variables provided the supporting architecture of firm decision-making essential to strategic theories of firms. BTF also helped to extend our understanding of competitive interaction and the performance of individual firms as well as industries (Nelson and Winter, 1982; Teece and Pisano, 1994; Teece et al., 2002), and served to propagate modern research on individual behavior in firms and markets (Kahneman and Tversky, 1979). Central to BTF is the idea that decision making consists in finding a satisfactory solution (satisficing) rather than in evaluating the best possible alternative (optimization). Behaviorally speaking, management is therefore the art of dealing effectively with the reality of bounded rationality in a changing environment. These themes remain as fresh and relevant today as they were when Cyert and March launched upon their endeavor in the early 1960s.

However, with very few exceptions, very little has been said by researchers in the tradition of Cyert and March about the behavior of entrepreneurial firms, whether they are conceptualized as small firms, young firms, or pre-firms. Even Knight's (1921) arguments have been viewed as mainly useful in explaining the existence of firms rather than as a way of thinking about how firms come to be. In this paper, we examine what we know about the behavior of entrepreneurs to deduce elements of a behavioral theory of the entrepreneurial firm (BTEF).

2. The behavior of entrepreneurs and the firms they found

Our analysis focuses on recent developments in studies of entrepreneurial expertise that take root from the intellectual seeds planted by Cyert and March. In particular, we explicate three ideas that parallel key concepts in the BTF: (1) accumulating stakeholder commitments under goal ambiguity (in line with a political conception of goals in BTF), (2) achieving control through non-predictive strategies (as opposed to managing expectations in BTF), and (3) having a predominately exaptive orientation in the entrepreneurial firm (that subsequently turns adaptive in the BTF sense as the entrepreneurial firm survives and grows). Together, these ideas can be collated into a model of entrepreneurial firm behavior that emphasizes transforming current realities to fabricate new environments rather than acting within extant environments. They also bring to light some interesting problems for future research.

There are at least two reasons for drawing upon entrepreneurial expertise as the starting point for developing a behavioral theory of how firms come to be. First, as others have pointed out (James, 1880; Moky, 1990; Wiener, 1993), it is at the beginning stages of a new venture that the effectiveness of the individual is highly significant:

Before any new idea can arise in theory and practice, some person or persons must have introduced it in their own minds. . . . The absence of original mind, even though it might not have excluded a certain element of progress in the distant future, may well delay it for fifty years or a century. (Wiener, p. 7)

This makes understanding the links and overlaps in the performance of the entrepreneur and the performance of the firm particularly important in the early stages of firm formation.

Second, it is widely recognized that effective decision-making is important for the creation and capture of value in any organization, entrepreneurial or otherwise. Furthermore, the skills and

abilities that generate high quality managerial decision-making, including problem-finding and solution-finding, are stored in individual minds as well as in organizational memory and routines (Nelson and Winter, 1982; Simon, 1993b; Teece and Pisano, 1994). Even Coase, whose work does not usually focus upon individual decision making, observed the pervasive importance of individual action:

In seeking to improve our treatment of such subjects [as the firm and the market], biological analogies can be very misleading. The firm, the market, the legal system are all social institutions and are the result of purposeful human activity. Ghiselin explains that natural selection has an IQ of zero. The IQ of businessmen and politicians may not be high, but it is not zero. (1988, p. 244)

This is particularly salient in the case of the entrepreneurial firm. What needs to be better understood is how individual minds *with and without the help of the organization* make decisions that are effective in the creation and sustenance of firms. Therefore, carefully bearing in mind that there are large expanses of BTF that may have no overlap with entrepreneurship, this paper focuses on those “zones” where we believe potential gains-from-trade exist between BTF’s notions of how firms behave and what we currently know about how the entrepreneurial process unfolds.

3. Relevant elements from A Behavioral Theory of The Firm

Cyert and March explicitly stated that they developed their framework for dealing with “the large, multi-product firm” (p. 115). If we are to discover how BTF can be applied to the development of a BTEF, we need to boil down Cyert and March’s ideas to key elements that we can then examine in greater detail. Augier and Sarasvathy (2004, p. 7) summarize their ideas as follows:

The *Behavioral Theory of the Firm* is at heart a theory that is built around a political conception of organizational goals, a bounded rationality conception of expectations, an adaptive conception of rules and aspirations, and a set of ideas about how the interactions among these factors affect decisions in a firm.

We will first briefly explain each of these three major elements and then outline four sub-elements, also of interest to our application of BTF to the entrepreneurial firm. Later in the paper, we will examine analogs to each of these elements and sub-elements within a BTEF.

3.1. A political conception of organizational goals

Cyert and March conceptualize goals as reflecting the demands of a political coalition, changing as the composition of that coalition changes. This is in marked contrast with rational choice theory, where goals are pictured as given alternatives each with a set of consequences attached, and the problem of choice consists in the selection of the best alternative. BTF’s political conception of goals is multi-dimensional with aspirations changing in response to the experiences of the organization and its components, as well as in comparison with the experiences of others inside and outside the organization. In particular, it is the dynamic nature of aspirations that enables the generation of new choice alternatives, in line with earlier arguments by Simon (1959) that alternatives are not given but must be searched for. This has later been interpreted and widely acknowledged to mean that firms must engage in active search and imagination to create sustainable strategic opportunities (Winter, 2000).

3.2. A boundedly rational conception of expectations

Firms in the behavioral view are seen as heterogeneous, boundedly rational entities. In the face of environmental uncertainty, therefore, these boundedly rational firms form expectations based on available information. Much of this information is gathered by search activity. The intensity of search depends on the performance of the organization relative to aspirations and the amount of organizational slack (March and Simon, 1958, pp. 47–52). The direction of search is affected by the location (in the organization) of search activity and the definition of the problem stimulating the activity.

Thus, the search activity of the organization both furthers the generation of new alternative strategies and facilitates the anticipation of uncertain futures. The search strategies explicated avoid the requirement that anticipated events in the distant future be predictable by using decision rules emphasizing short-run reaction to short-run feedback rather than anticipation of long-run uncertain events (solve pressing problems rather than develop long-run strategies).

3.3. An adaptive conception of rules and aspirations

In Chapter 9 of the book, Cyert and March point out that “decision making” in the behavioral theory takes place (a) in response to a problem, (b) through the use of standard operating procedures and other routines, and (c) through search for an alternative that is acceptable from the point of view of current aspiration levels for evoked goals. Problem definition, therefore, is an important aspect of decision making in the behavioral firm. Furthermore, existing rules and procedures reflect past learning by the organization. Decision-making is also influenced by the order in which alternatives are considered and by anything that affects aspirations and attention.

Within this framework, four concepts were developed (Cyert and March, p. 123):

We have described four basic concepts that seem to us fundamental to an understanding of the decision-making process in modern, large-scale business organization. The quasi resolution of conflict, uncertainty avoidance, problemistic search, and organizational learning are central phenomena with which our models must deal.

A part of Cyert and March’s political conceptualization of goals is *Quasi-resolution of conflict* (i.e., the idea that though firms function with considerable latent conflict of interests, they do not necessarily resolve that conflict explicitly). *Uncertainty avoidance* refers to the fact that although firms try to anticipate an unpredictable future insofar as they can, they also try to restructure their worlds in order to reduce their dependence on such anticipation. *Problemistic search* emphasizes that search within a firm is stimulated primarily by problems. *Organizational learning* highlights the fact that firms learn from their own experiences as well as the experiences of others (Levinthal and March, 1993).

Taken together, these ideas seek to explain the processes by which established firms behave in interaction with their environment. In evidencing and developing these ideas, later scholarship has generally assumed that large firms are embedded in an environment of existing markets, alliances, technologies, and so on. A major thrust in this line of research involves evolutionary approaches (i.e. explaining the evolution of populations of firms consistent with behavioral assumptions based on Cyert and March). For this research stream, explaining variation among firms is an important issue, and much evolutionary theorizing looks to concepts devised by Cyert and March to explain why firms are different. According to Teece et al., “Perhaps the most basic contribution

of [the behavioral theory of the firm] is their recognition of the fundamental importance of firm heterogeneity” (Teece et al., p. 85). Teece et al. further argue that the ideas from BTF about the characteristics of firms “have been verified. The idea that firms are fundamentally heterogeneous, in terms of their internal knowledge, skills, and resources, is at the heart of the field of strategic management” (p. 85). They base this conclusion on the empirical work by Hansen and Wernerfelt (1989) and Rumelt (1991) showing that performance is not understandable through industry level effects alone—and that firm heterogeneity matters. Teece et al. conclude therefore that, “Most subsequent economic theories of firm strategy are consequently intellectual descendants of Cyert and March’s early efforts” (p. 85).

One of the things that has not been talked about in this regard is the role of the entrepreneur in *making* firms heterogeneous. All firms, including spin-offs of large corporations, are usually started by individuals working in small teams (Klepper and Sleeper, 2005) and their footprints persist and initiate path dependencies that sustain heterogeneity even in the face of pressure to cohere to industry norms down the road. Boeker (1989) shows this empirically as an imprinting effect stemming from the foundation of the firm that endures and sustains firm heterogeneity. Entrepreneurship scholarship generally recognizes this importance of firm heterogeneity, but also emphasizes differences in the environmental circumstances of the new firm as compared to those of established firms.

4. Entrepreneurial firms and their environments

4.1. The context of entrepreneurship

One potentially fruitful way of thinking about entrepreneurship is that it is concerned with understanding how, in the absence of markets for future goods and services, these goods and services manage to come into existence (Venkataraman, 1997). Entrepreneurship therefore focuses on how interesting new variations (new products and services, new ways of embodying technologies, new institutions, new customer needs and wants, new production and supply variants, new ways of organizing) are introduced in a market economy (Schumpeter, 1934). To the extent value is embodied in these products, services and other artifacts, entrepreneurship can be viewed as being concerned with how the opportunity to create new “value” in society is initially generated. This inevitably involves some individuals acting in concert with others (whom we may loosely describe as their stakeholders) to form new political coalitions that are transformed into new economic entities. The organization of individual stakeholders into new firms and new markets is an intrinsic part of this process.

Therefore, a central differentiator between entrepreneurial firms and existing firms examined in the BTF is that the twin institutions that comprise the capitalist market system, firms and markets (Coase, 1988), are *not assumed as givens* in entrepreneurship. Either the firms are new, or the markets are new, or both. If we follow the conventional lines of evolutionary and ecological reasoning in economics and sociology (Geroski, 2002), we see that entrepreneurship is centrally concerned with how two key elements of the market system are originated: first, how the firms that offer new goods come to be, and second, how “the market,” which is hypothesized to select among firms, comes to be. Thus entrepreneurship is the study of processes and methods of origination of *both* evolutionary mechanisms, namely, *variation* and *selection*. As careful students of economic evolution have observed, it should come as no surprise at all that the origination of markets and firms are interlaced and often develop in concert with one another (Nelson and Winter, 1982).

The fact that one or both of the twin institutions of capitalism, market and firm, do not exist in many entrepreneurial situations suggests that a behavioral theory of the entrepreneurial firm might not only overlap with Cyert and March's conceptions, but might also dramatically differ from them. One such difference might consist in conceptualizing entrepreneurial firms as facing *design* problems instead of facing *decision* problems (Sarasvathy, 2003). The notion of *design* here is the one examined by one of Cyert and March's close collaborators, Herbert Simon, in *Sciences of the Artificial* (1981). 'Designing' is not used here in the sense of planning to achieve a pre-determined or desired outcome. Instead, the primary goal of designing artifacts involves producing *novelty* of some kind or another, be it new firms, new markets, new technologies or even new societies. Simon argued this in several ways such as

To speak of planning without goals may strike one as a contradiction in terms. It seems "obvious" that the very concept of rationality implies goals at which thought and action are aimed. How can we evaluate a design unless we have well-defined criteria against which to judge it, and how can the design process itself proceed without such criteria to guide it?

Some answer has already been given to these questions in chapter 4, in the discussion of discovery processes. We saw there that search guided by only the most general heuristics of "interestingness" or novelty is a fully realizable activity. This kind of search, which provides the mechanism for scientific discovery, may also provide the most suitable model of the social design process. (1981, p. 162)

Simon also contrasted the anatomy of design, with that of decision by focusing on the essential features of the two (Sarasvathy and Simon, 2000) as follows:

The anatomy of a decision, as described in decision theory, involves the following:

- A given well-structured and specific goal to be achieved.
- A set of alternative means for achieving it.
- Constraints on possible means (usually imposed by the environment).
- Criteria for selecting between the means (satisficing based on the quasi resolution of conflicting goals).

In other words, decision makers seek to achieve given goals within a given environment and strive to adapt to changes in that environment by investing in better predictions and faster responses. In this case, decisions are responses to the dynamics of the environment. In contrast, the processes of design may be described as being *effectual* and involve (Sarasvathy and Simon, 2000; Sarasvathy, 2001):

- A given set of constraints on the means (largely consisting of unalterable characteristics and circumstances of the decision maker).
- A set of possible operationalizations (effects) of very generalized goals (mostly generated through discovery processes).
- Constraints on (and opportunities for) possible effects (usually imposed by the contingencies of a dynamic and interactive environment).
- Criteria for selecting between the effects, many generated by interaction with the events of the developing situation, and some concerned with a (somewhat predetermined) level of affordable loss or acceptable risk in light of the constraints on the means.

In other words, design strategies allow goals to emerge from interactions with stakeholders, contingent upon the means that become available in the process. Together the stakeholders seek to shape and fabricate the (initially) *local* environment. In this formulation, both the entrepreneurial firm and its local environment are therefore a residual of a design process that uses an effectual logic.

4.2. The logic of effectuation and its empirical basis

Effectuation has been discussed in detail in other articles, including Sarvasvathy (2001), Sarvasvathy and Dew (2005a,b) and Wiltbank et al. (2006). In this section of the paper we briefly review some of the key elements of the logic.

As we saw in the previous section, effectuation is a logic of design rather than that of decision or discovery. By “logic” we mean an internally consistent set of ideas that forms a clear basis for action upon the world. In the context of a firm, this basis consists (broadly) of negotiated goals, transformable environments, and exaptive strategies. In other words, effectuation does not assume pre-determined and clearly specified goals. Goals emerge as part of negotiations with stakeholders, as we will see in greater detail in Section 5.1 below. These stakeholder negotiations not only result in new goals and reframe the initial set of opportunities the firm seeks to realize, but also explicitly reshape and transform the environment in which the organization operates. In this sense, effectual firms act not only *within* market environments, but also *upon* them and in some cases, end up creating new markets not predictable *ex ante* even by the very stakeholders involved in the negotiation process. Not taking the environment as given and/or predictable also implies that adaptive or other types of reactive strategies are inadequate and even inappropriate in the effectual process. Instead, entrepreneurial firms that use an effectual logic tend to develop exaptive strategies. Exaptation is another notion that we will examine in some detail in Section 5.3.

In sum, effectual logic is *non-predictive* in the sense that it does not require clear goals, accurate predictions, or an adaptive stance toward a largely exogenous environment. Instead, effectuation implies a specific stance toward the world and its occupants that can be theoretically contrasted with a causal or predictive orientation as follows:

- Causal logic is based upon the premise that better predictions lead to better control over outcomes; effectual logic argues that to the extent that each stakeholder controls pieces of the environment and values genuine novelty in outcomes, investments in prediction are redundant.
- Effectuation involves seeing the world as open, still in-the-making. Effectuators see a genuine role for human action. In fact, they see both firms and markets as human-made artifacts and not inevitable results of broad historical, economic or technological forces.
- Effectuators very rarely see opportunities as given or outside of their control. For the most part, they work to fabricate, as well as recognize and discover opportunities.

Note that the generalized end goal or aspiration remains the same in both effectual and causal decision making, for example, to build an enduring organization. What distinguishes causation and effectuation is the problem frame: choosing among means to create a particular effect versus designing possible effects using a particular set of means.

Consistent with other work in the Carnegie tradition (such as BTF), effectuation is strongly empirically based. The baseline model of effectuation was initially induced from a protocol study of expert entrepreneurs (Sarvasvathy, 1998) and the process of effectuation from a study of new

market creation (Dew, 2003). We provide a description of each of these two studies below. We also briefly review eight other empirical studies that show how the key constructs in effectuation have been empirically investigated using multiple research methods. Table 1 summarizes these studies.

The baseline model of effectuation was inductively derived from a cognitive problem-solving study of expert entrepreneurs that used a “think aloud” protocol (Ericsson and Simon, 1993). Twenty-seven expert entrepreneurs worked through a 17 page problem set consisting of 10 prob-

Table 1
Summary of empirical studies of effectuation

Study type	Key results	Reference
Dissertation: protocol analysis	Induced theory of effectuation from empirical data consisting of expert “think-aloud” protocols	Sarasvathy (1998)
RealNetworks case study	Found evidence of all 5 key effectual constructs in the founding of RealNetworks	Sarasvathy and Kotha (2001)
Dissertation: industry study	Induced process model of effectuation from historical and interview data on industry formation	Dew (2003)
Dissertation: protocol and survey	Found a strong correlation between the use of effectuation and experience; found most psychological measures of personal traits are uncorrelated with use of effectuation (sample of MBA students)	Allen (2003)
Dissertation: multi-task protocol study	Validated the usefulness of the expertise lens in studying entrepreneurship	Gustavsson (2004)
Carmax case study	Found 48 percent causal and 52 percent effectual decision elements in the founding process of Carmax	Harting (2004)
Croatian Business School case study	Found new Croatian MBA program developed initially through an effectual logic, and gradually incorporated more causal principles as it grew across five times periods	Harmeling et al. (2004)
Protocol analysis	Found significant differences in the logical frames used by expert entrepreneurs and sample of MBA students	Dew et al. (2006)
Meta-analysis	Meta-analyses of 24 journal articles found significant relationships between venture performance and 3 effectual constructs (means-orientation, stakeholder partnering and contingency leveraging)	Read and Song (2007)
Survey	Found prediction and control variables were significant predictors of angel investor performance	Wiltbank et al. (in press)

lems that typically need to be solved in order to transform a new idea into a new firm. A model of expert entrepreneurial decision making was induced from subjects' transcriptions; this model was named *effectuation*. The model reflects the fact that expert entrepreneurs appear to problem solve in a non-teleological, non-predictive and non-adaptive fashion. These are themes that we develop in more detail in the course of this paper.

The study by Dew revealed the dynamics of effectuation. Using both historical data and contemporary interviews, the study showed how a small group of effectuators patched together a new stakeholder network that resulted in a new organization and new market. The origins of these new entities lay in commitments made by self-selected stakeholders. These early stage networks were found to benefit from ambiguity of preferences (a topic prominent especially in March's later work, e.g. 1978, 1982) because ambiguities allowed a variety of stakeholders to come together and define a new project as they went along. This suggests that—under some circumstances—uncertainties about preferences can be conducive to the creation of new technological and social artifacts (Sarasvathy and Dew, 2005b).

Eight other empirical studies shown in Table 1 corroborate and extend the static and dynamic elements of effectuation. Studies by Gustavsson (2004), Allen (2003), Dew et al. (2006) use protocol methods. These studies confirm that significant differences exist between expert entrepreneur groups and control groups and that effectuation variables are significant irrespective of personality traits. Studies by Sarasvathy and Kotha (2001), Harting (2004) and Harmeling et al. (2004) use case methods to show the presence of effectuation in a variety of new venture histories. Through a meta-analysis of 24 prior studies, Read and Song (2007) show that three key effectual constructs significantly predict new venture performance. Finally, Wiltbank et al. (in press) use a survey instrument to show that prediction and control variables postulated in effectuation are significant predictors of new venture investor performance.

Taken together, these empirical studies suggest that entrepreneurs do use effectual elements in the processes of building new firms. Key differences between effectuation and predictive decision-making are summarized in Table 2.

In the next section of the paper we extend these ten constructs of entrepreneurial expertise to the firms that entrepreneurs found and suggest that the ensuing behavioral theory of the entrepreneurial firm not only is consistent with Cyert and March's political conceptualization of goals and Sarasvathy's effectual conceptualization of non-predictive control, but it is also predominately a story of exaptation rather than adaptation. We will examine each of these contrasts in detail in the next sections of the paper.

5. A behavioral theory of the entrepreneurial firm

5.1. Accumulating stakeholder commitments under goal ambiguity

In line with a political conception of goals developed and analyzed by Cyert and March, our BTEF explicitly questions the role of goals portrayed in several aspects of the literature on entrepreneurship (Stevenson, 1988; Tellis and Golder, 2002). Instead, a BTEF starts by assuming that purposes emerge within the processes undertaken by the entrepreneurial firm; they are not necessarily given a priori. Consistent with the idea that goals exist in hierarchies (Simon, 1964), we simply suggest that while goals at the highest levels might be clear, their operationalizations at lower levels may be highly ambiguous. Take for example the motivations of an entrepreneur who may want to make \$40M by age 40. This 'goal' while it may appear specific and clear is not easy to translate into immediate sub-goals that can actually be enacted (i.e., it does not provide

Table 2
Summary of differences between prediction and effectuation

Issue	Predictive position	Effectual position
View of the future	<i>Prediction.</i> The future is a continuation of the past; can be acceptably predicted	<i>Design.</i> The future is contingent on actions by willful agents
Constructs pertaining to individual decisions		
Givens	<i>Goals</i> are given	<i>Means</i> (who I am, what I know, and whom I know) are given
Decision agenda	<i>Resources.</i> What resources ought I to accumulate to achieve these goals?	<i>Effects.</i> What effects can I create with the means I have?
Basis for taking action	<i>Desired worlds.</i> Vision of a desired world determines goals; goals determine sub-goals, commitments, and actions	<i>Possible worlds.</i> Means and stakeholder commitments determine possible sub-goals—goals emerge through aggregation of sub-goals
Basis for commitment	<i>Should.</i> Do what you ought to do—based on analysis and maximization	<i>Can.</i> Do what you are able to do—based on imagination and satisficing
Stakeholder acquisition	<i>Instrumental view of stakeholders.</i> Project objectives determine who comes on board	<i>Instrumental view of objectives.</i> Who comes on board determines project objectives
Constructs in terms of responses to the environment		
Predisposition toward risk	<i>Expected return.</i> Calculate upside potential and pursue (risk adjusted) best opportunity	<i>Affordable loss.</i> Calculate downside potential and risk no more than you can afford to lose
Predisposition toward contingencies	<i>Avoid.</i> Surprises may be unpleasant, so invest in techniques to avoid or neutralize them	<i>Leverage.</i> Surprises can be positive, so invest in techniques that are open to them and leverage them into new opportunities
Attitude toward success/failure	<i>Outcomes.</i> Success and failure are discrete outcomes to be sought after or avoided, respectively	<i>Process.</i> Successes and failures are inputs into a process that needs to be managed such that failures are outlived and successes are accumulated
Attitude toward probability estimates	<i>Update beliefs.</i> Estimates are used in a Bayesian fashion—to update ones beliefs about the future	<i>Manipulate conditionals.</i> Estimates signal that conditionals may be reified or falsified so the future can be skewed through action
Attitude toward others	<i>Competition.</i> Constrain task relationships with customers and suppliers to what is necessary	<i>Partnership.</i> Build YOUR market together with customers, suppliers and even prospective competitors
Underlying logic	To the extent we can predict the future, we can control it	To the extent we can control the future, we do not need to predict it

a compelling reason for the entrepreneur to commit to any particular course of action). In this sense, an actor may experience high levels of goal ambiguity even in the face of a clear vision of what s/he wants down the road.

Our view is consistent with questioning the assumptions that underlie the idea that human action can best be understood as the pursuit of pre-conceived goals. Within management literature, March has called for theories that do not assume pre-existent goals (March, 1982, p. 75):

To say that we make decisions now in terms of goals that will only be knowable later is nonsensical—as long as we accept the basic framework of the theory of choice and its presumptions of pre-existent goals. I do not know in detail what is required, but I think it will be substantial. As we challenge the dogma of pre-existent goals, we will be forced to reexamine some of our most precious prejudices. . . . We should indeed be able to develop better techniques. Whatever those techniques may be, however, they will almost certainly undermine the superstructure of biases erected on purpose, consistency, and rationality. They will involve some way of thinking about action now as occurring in terms of a set of unknown future values.

Along the same lines, Joas (1996) points out that some of the greatest thinkers of the twentieth century (Dewey, Heidegger, Merleau-Ponty, Wittgenstein, and Ryle) have directly challenged conventional assumptions about goals and instead argued for

. . . the impossibility of defining human life as a whole in terms of chains of means and ends. . . . If we summarize these admittedly quite discrete arguments showing the limited applicability of the means-ends schema, we find that neither routine action nor action permeated with meaning, neither creative nor existentially reflected action can be accounted for using this model. (p. 156)

Instead, Joas locates human action firmly within the continual interaction of the human body (corporeality) with the real world (situation) and with other people (sociality):

The means-ends schema cannot be overcome until we recognize that the practical mediacy of the human organism and its situations precede all conscious goal-setting. A consideration of the concept of purpose must ineluctably involve taking account of the corporeality of human action and its *creativity*. (p. 158, italics added)

As a first step in building a behavioral theory of the entrepreneurial firm based on creative action, we use effectuation in juxtaposition with Cyert and March's ideas. We catalog four critical variables of interest from BTF (on the left-hand side of Table 3) and map each of them to analogues descriptive of entrepreneurial effectuation (on the right-hand side).

First, let us consider the notion of *problemistic search* in BTF. Problemistic search is motivated by shortfalls on goals or by changes in aspiration levels. In effectuation, available means drive action. Effectual action involves transforming extant means into new possibilities, including new problems of interest. New goals, in this case, are simply the outcomes of action rather than the criteria for searching problem spaces. This means that effectuators, instead of exhibiting uncertainty avoidance as organizational actors do, seek to leverage contingencies. As Joas might argue, and Simon (1981) has emphasized, creative action necessarily implies a taste for the "Aha!" feeling, openness to genuine surprises, and a flexible approach that emphasizes exploiting the unexpected and serendipitous (Denrell et al., 2003). In an ecology of unpredictability, effectuating firms might be expected to behave in ways that insulate them from rationality and learning in the

Table 3
BTF and BTEF major relational constructs

BTF construct	BTF detail (Cyert and March, 1963)	BTEF construct	BTEF detail
Problemistic search	Search is <ol style="list-style-type: none"> (1) Motivated: stimulated by a problem (2) Simple minded: has a goal, and understanding contributes to control (3) Bias in search: expertise, aspirations, unresolved goals 	Means-driven trans-formation	Entrepreneurial setting: <ol style="list-style-type: none"> (1) Search is irrelevant, as search is goal-driven and effectuation is not (2) Opportunities emerge as a function of means (3) Transformation process is actor-centric. Who comes on board determines goals, not vice versa
Uncertainty avoidance	Avoid the requirement that anticipated events in the distant future be predictable by using decision rules emphasizing short-run reaction to short-run feedback rather than anticipation of long-run uncertain events	Leveraging contingency	<ol style="list-style-type: none"> (1) Short run feedback is good (2) But surprises can be good too; even 'bad' surprises can be leveraged to provide new means and new opportunities (3) Actions emphasize commitment and contingency, not choice and determinacy
Organizational learning	Learning accomplished through <ol style="list-style-type: none"> (1) Adaptation of goals (2) Adaptation of attention rules (3) Adaptation of search rules 	Technology of foolishness	Insulation from learning sought through <ol style="list-style-type: none"> (1) Logic non-predictive control (2) Commitment with regard to affordable loss, not expected consequences or appropriateness (3) Creative action based on play
Quasi-resolution of conflict	Conflict exists and should be managed as follows: <ol style="list-style-type: none"> (1) Goals as independent constraints (2) Local rationality (3) Acceptable level decision rules (4) Sequential attention to goals 	Docility	Conflict is avoided through stakeholder docility (dissenting stakeholders self-select out): <ol style="list-style-type: none"> (1) Goals are a residual of the process (2) Bounded rationality (3) Decisions do not distinguish firm from environment and hence can be locally optimal (4) Sequential attention to means

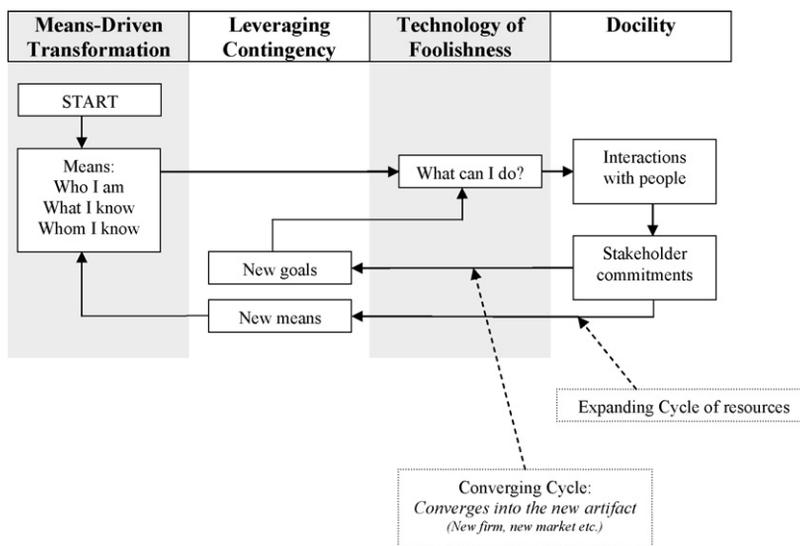


Fig. 1. Critical relationships among BTEF variables.

adaptive sense (March, 2006). Instead they might be better viewed as engaging in a *technology of foolishness* as it were (March, 1982; Sarasvathy and Dew, 2005a,b).

Second, as we will see next in our exposition of the dynamics of effectuation, *quasi resolution of conflict* is not very relevant since the process of stakeholder selection in effectual settings is actually a process of *self-selection*. Effectuation assumes *docility* as a fundamental behavioral construct applicable to all stakeholders (Simon, 1993a); that is, participants in the effectual process are both persuadable and persuasive to varying degrees about different things.

The variables on the right hand side of Table 2 can be set in motion into a dynamic process (illustrated in Fig. 1) as follows:

- (1) *Beginning with means*. There are three categories of means available to all human beings and can be simply described as (1) Who I am, (2) What I know, and, (3) Whom I know. *Who I am* consists in the stable traits, abilities and attributes of the effectuator; *What I know* includes his education, experience and expertise; and *Whom I know* refers to his social networks. The effectuator's pool of resources (i.e. "*What I have*") is taken as a function of the above three categories of means. The fundamental agenda for the effectuator then becomes, *What effects can I create, given who I am, what I know, and whom I know?*
- (2) *Courses of action*. The effectuator begins by imagining several possible courses of action, the consequences of which are, for the most part, unpredictable. Therefore, these courses of action are evaluated in terms of what the entrepreneurial firm is willing to lose in order to attempt a particular course of action. This assessment of affordable loss can be almost entirely based upon things already known by the effectuating firm, such as its current net worth. This minimizes reliance on predictive information.
- (3) *Stakeholder interactions*. Furthermore, courses of action are co-determined by stakeholders who self-select into the entrepreneurial firm based on their willingness to commit something to the venture. In general, stakeholders in the entrepreneurial firm not only provide resources, but they also set immediate agendas and generate new sub-goals for the venture through negotiations

with other stakeholders. These negotiations may involve newcomers either persuading or being persuaded by existing stakeholders. Since the market is still not quite made, these stakeholders also make commitments in the face of unpredictable consequences, and it makes sense for them too to act on the basis of what they can afford to lose. The focus of the entire effectual process *for each individual involved* is on what *can* be done, given who s/he is, what s/he knows, and whom s/he knows. As Fig. 1 shows, almost the very first action of effectuators is to begin interactions with people they know or meet. Inter-subjective interaction is the very essence of the effectual process.

(4) *Two concurrent dynamic cycles.* Fig. 1 traces the effectual process as follows: based on who she is, what she knows, and whom she knows, the effectuator generates a set of possible actions and starts interacting with people in her environment. Both she and her potential stakeholders compare aspirations and abilities, debate the possibilities that they envision, and begin negotiating features of the project. Note that at this stage, both outcomes and returns to outcomes are vague and unpredictable at best, so the content of the negotiations is focused on the nature and characteristics of the project (i.e. what the pie may look like) rather than the type and quantity of returns to the project (i.e. the size and distribution of the pie). Depending on what the stakeholders are willing to commit to any possible common project and what they negotiate in return for their commitment, a chain of means and goals available to the stakeholders begins to form. Assuming that this chain grows unbroken for a meaningful period of time, two cycles of consequences are set in motion: one is a widening cycle that increases the pool of resources available to the growing stakeholder group; the other is a converging cycle that pushes the growing group toward increasingly specific goals that coalesce into the new artifact. Thus, in an effectual network, ends are outcomes of action that depend at any given point in time on which particular actors are involved, the sequence of their participation, and the specific commitments they make to the network.

(5) *Co-determination of effectual network and artifact.* To understand the goal-emergence process more clearly, we need to consider two sets of goals, one consisting of the goals of individual members, and the other of the effectual network. While individual members may have a variety of goals in different hierarchical schemes with different levels of ambiguities, the network's goals are always particular transformations on the artifact they are designing. Therefore, only those individual goals that any given member can embody in particular transformations on the extant artifact would be relevant to the analysis.

A lucid illustration of this can be found in Lindblom (1959). When lawmakers sit down to draft a bill on say, partial birth abortion, their prior positions on the issue are relevant only to the extent that they agree or disagree about particular provisions of the bill, sometimes only to the extent of individual clauses. Therefore, even arch opponents on principles can come together at the margin on particular provisions and end up with a draft of the bill both sides can live with. Those who may be ambivalent at the level of principles can commit to particular provisions without first resolving their conflicts as to the larger values involved. Similarly, for our analysis, we do not need to make any precise assumptions on individual preferences and goal clarity. Only actual stakeholder-commitments to particular transformations of the artifact drive goal formation. Reasons for making commitments may range from pre-existent preferences to docility, passions and convictions to self-interest and fun, reformatory zeal to indifference.

Contrast this with the traditional (straw man) ideal of a visionary entrepreneur who first creates a compelling plan based on solid research and careful predictions; then persuades just the right stakeholders to come on board, negotiating valuable resources from them; and

finally, hires the right people to execute the plans flawlessly, or, alternatively, the altered image of entrepreneurs who relentlessly pursue their visions (Tellis and Golder, 2002; Bornstein, 2004) without regard to the matter-of-fact trade-offs that exist in real life, such as knowing when to quit and knowing when to press on (the problem of optimal perseverance (March, 1978)).

In the effectual process, the artifact, whether a firm or market or organization or institution, *embodies* idiosyncrasy, taking a shape that might be unanticipated and sometimes even initially unimagined by any individual stakeholder involved in the project, but the heterogeneity is designed in through negotiation and not merely a result of random variation. Empirical case studies and histories of entrepreneurial ventures in both for-profit and social sectors provide evidence that this entrepreneurial process does lead to novelty in both goals and artifacts (Sarasvathy and Kotha, 2001; Harmeling et al., 2004).

5.2. *Achieving control of the environment and the future through non-predictive strategies*

One of the key conclusions in the BTF is the idea that organizations actively avoid uncertainty and also manage expectations in a boundedly rational manner. Cyert and March point to two primary mechanisms by which this is accomplished: (1) avoiding long run excursions into the environment, and (2) negotiating with the environment for stability. In the first case, organizations primarily deal with short run reaction to short term feedback from the environment, avoiding the difficulties associated with long run predictions of an uncertain future. In the second case, firms implicitly and explicitly signal, negotiate and share perspectives with other firms in order to stabilize the environment for all. Cyert and March conclude that

Our studies . . . lead us to the proposition that firms will devise and negotiate an environment so as to eliminate the uncertainty. *Rather than treat the environment as exogenous and to be predicted, they seek ways to make it controllable.* (p. 120, emphasis added).

Our studies of entrepreneurial expertise take root from these intellectual seeds planted by Cyert and March but suggest that, in some circumstances such as in entrepreneurship, re-constituting control as the *central* basis of economic decision-making might prove fruitful. ‘Control’ here refers to working with things within one’s control and not a visionary zeal to achieve control over things currently outside one’s control. Despite Cyert and March’s informed observations, efforts in the literature on decision-making under uncertainty have almost exclusively been dedicated to causal analyses. These analyses invariably encourage more complete efforts to generate improved predictions precisely because good prediction allows us to capitalize on our expectations in order to control the future to some degree. According to March (2006, p. 202), “The basic rational rubric has become an almost universal format for justification and interpretation of action,” but by focusing so much on causal and, hence, predictive methods of choice, we have mostly neglected the study of techniques of control that do not require us to predict the future (Wiltbank et al., 2006).

We agree that there are several circumstances where people disregard predictive information, sometimes leading to over-optimism in their forecasts and sometimes to exaggerated risk-aversion (Kahneman and Lovallo, 1993), but in cases where there are good reasons to approach the future as truly unknowable, merely focusing on better prediction may not be useful or even meaningful. This is particularly true in domains of design, whether the design involves physical or social artifacts. In Sciences of the Artificial, Simon (1981) argued this point compellingly:

Since the consequences of design lie in the future, it would seem that forecasting is an unavoidable part of every design process. If that is true, it is cause for pessimism about design, for the record in forecasting even such “simple” variables as population is dismal. If there is any way to design without forecasts, we should seize on it. (p. 188)

Therefore, methods of designing without forecasting or forming expectations or using predictions would seem to be attractive in some circumstances.

The technology of prediction is based on the premise that *what can be predicted can be controlled*. This approach parallels the way prediction is used in science, where it has been found to be useful in controlling natural phenomena, but in studying the behavior of the entrepreneurial firm, we suggest there is an opportunity to repaint this picture by considering Knight’s three types of uncertainty: (i) known distributions with unknown draws (probability), (ii) unknown distributions with unknown draws (statistical probability), and (iii) non-existent distributions (subsequently known as Knightian uncertainty). The transformation from non-existent to risky distributions has been consistently conceptualized in the literature as a product of entrepreneurial behavior (Buchanan and Vanberg, 1991), yet the technology of prediction provides no theoretical “solution” to Knightian uncertainty. We might instead theorize that a logic of control has an important place in the behavior of entrepreneurial firms, based on the idea that *what can be controlled does not need to be predicted* (Wiltbank et al., 2006).

In the behavioral theory of the entrepreneurial firm, decision makers are theorized as dividing the environment into controllable and uncontrollable parts. They then focus on working with what they can control and using readily available levers to transform the environment in unanticipated ways. This means acting under a rubric of “design” rather than “discovery” (i.e. placing an emphasis on taking actions that fabricate opportunities rather than searching for them). It also means little attention is given to searching for pre-existent competitive threats because the entrepreneurial firm does not know which markets or event spaces it may end up constructing.

The concept of “control,” like the concept of design, usually conjures up images of blueprints and plans leading to pre-specified outcomes, but it is also possible to envisage “control” not as control over outcomes, but as control over the environment achieved through local transformations enabled by available means. Novelty and unpredictability have critical implications for the resource acquisition process in the entrepreneurial firm. Outcomes to novelty are by definition indeterminate; therefore commitments are not determined by calculating the expected value of those commitments in the current environment (as this would make no sense). Instead, commitments are made based on affordable loss, and in lieu of predetermined goals driving the selection of particular stakeholders, stakeholder commitments decide which projects to commit to, including those that originate wholly at the negotiation table.

This new notion of non-predictive control managed through a process of stakeholder interaction highlights the positive potential of contingencies, but one cannot avoid negative surprises in the pursuit of positive ones. Therefore, failure management is an important aspect of the behavior of entrepreneurial firms. Since it is impossible to avoid failures in the ecology we are describing, the survival of the entrepreneurial firm simply depends on accumulating enough successes over time to outweigh its failures.

Although we see entrepreneurial firms as emphasizing non-predictive control mechanisms, we do not mean to suggest that there is no place for probability assessments in the BTEF. Entrepreneurial firms do use probability estimates. However, we conjecture that they use them in a non-conventional way. As Sarasvathy and Menon (2002) have shown, probability estimates can be used not only as inference engines but also as “control engines,” signaling which conditionals

may be manipulated or created in order to re-formulate event spaces. The entrepreneurial firm might focus on the conditioning assumption and attempt to control particular outcomes by manipulating and reformulating these underlying assumptions, consequently reifying or falsifying the predictions based on them.

In the case of both prediction and control, we assume economic actors want to guide themselves towards favorable outcomes, but they can achieve these outcomes in several ways: for example, by taking their environments as largely exogenous and trying to predict and/or adapt to its behavior and trajectory, or, alternatively, by seeking to control the environment to the extent possible, as Cyert and March long ago argued. Non-predictive strategies in the behavioral theory of the entrepreneurial firm constitute an extreme case of the control orientation suggested by Cyert and March.

5.3. Predominately exaptive, rather than adaptive orientation

One central idea of BTF is the idea of *adaptation* as an expression of organizational learning. This notion of adaptation appears in various guises throughout the book, but most directly in theorizing the ways in which firms adaptively update their goals, what they pay attention to, and how they search for solutions to problems. Cyert and March express that, as a result, the book “characterizes the firm as an *adaptively rational* system rather than an *omnisciently rational* system” (p. 99). The procedures involved in adaptively updating the firms goals, attention and search routines are simply premised on the firm achieving a somewhat *better* fit with a given and changing environment; over the long run this adaptive fit must be good enough for the firm to survive. Summarizing, they state:

[S]o long as the environment of the firm is unstable (and unpredictably unstable), *the heart of the theory* must be the process of short-run adaptive reactions. (p. 100, italics added).

A BTEF takes a somewhat different view of the entrepreneurial firm’s behavior. This view is derived from two important differences between the established firm and the entrepreneurial firm. First, established firms have established demarcation points between the firm and its environment. The firm’s boundary is drawn-up by a variety of formal and informal mechanisms, including legal terms, bureaucracy, custom, practice, and by routines that define who interacts most frequently with whom, and so on. By contrast, for the entrepreneurial firm, this line between “the firm” and “the environment” is not clearly drawn. Instead, the entrepreneurial firm’s boundary is a *design* problem in itself. Second, in established firms the “rules of engagement” are established. By processes of trial-and-error, feedback and successive adaptive adjustment, the firm learns to employ its resources in a fairly fine-tuned way to satisfy the stakeholders that make up its established (and therefore *taken-as-given*) environment. By contrast, in the entrepreneurial firm, no clearly laid-out procedures exist for how the firm should act because (a) there are no established practices, and (b) there is no taken-as-given environment. Again, the entrepreneurial firm faces a design problem rather than an adaptation problem.

As a result, we might expect that the way entrepreneurial firms use the means they accumulate through stakeholder commitments could be different than the ways established firms act in Cyert and March’s study. To understand why this is, we merely need to appreciate that adaptation theories assume the generation of variation, *ex-ante*. In BTF variation is theorized as being introduced through active search processes, such as through exploration (March, 1991). Exploration may be serendipitous (may result in unanticipated discoveries), but it is mostly theorized in BTF to be explicitly adaptive (i.e. to be structured in ways viewed as appropriate and relevant to the

particular environmental challenges the established firm faces). These adaptive search procedures are themselves subject to adaptive updating (Cyert and March, p. 124).

In the entrepreneurial firm, the method of generating variation is different: in these firms the process of effectuation serves as the method for producing variation. One of the basic premises of effectuation is that it is means-driven (focused on the question “what can we do?” with our means, rather than “what should we do?” given our environment). Penrose (1959) long ago pointed out the strategic significance of the different ways in which firms can approach their use of means:

The services yielded by resources are a function of the way in which they are used—exactly the same resources when *used for different purposes or in different ways* and in combination with different types or amounts of other resources provides a different service or set of services. (p. 25, italics added)

One obvious formulation of this means-driven technique of formulating one’s goals in management is captured by the old adage, “To a man with a hammer, the world looks like a nail.” Effectuation points to the fact that entrepreneurs look at the hammer in their hands and not only ask themselves “What can we do with a hammer?” but also, “What *else* can we do with a hammer beside hit nails on their heads?” This process of asking “what else?” is innately focused on generating variation in unanticipated and often playful ways (March, 1982; Sarasvathy and Dew, 2005a). Because the services yielded by resources are a function of the ways in which they are used, entrepreneurial behavior *transforms* resources by converting them from established uses to new uses. This method of generating variation contrasts with other ways of producing variation such as the idea that, in a world full of nails, variations of hammers are devised to best suit different kinds of nails (reportedly 1000 different kinds of hammers were in active employ in the city of Birmingham during England’s industrial revolution).

Such transformation processes are known as *exaptations*, a term derived from the literature in evolutionary biology, where it is becoming increasingly popular (Gould and Vrba, 1982; Gould, 2002; Dew et al., 2004; Wikipedia, 2006). According to the economic historian Joel Mokyr (2002, p. 57), “The basic idea is that a technique that was originally selected for one trait owes its later success and survival to another trait which it happens to possess”. An example can be found in the history of Riverdale Mills, established in 1978 by entrepreneur Jim Knott. Riverdale was founded to make lobster traps. Knott came up with the idea of making lobster traps out of a material he called “Aquamesh” (a plastic-dipped galvanized wire mesh) on a trial-and-error basis after years of personal experience with wooden lobster traps that kept rotting and falling apart. However, after 20 years, during which Riverdale became stunningly successful in the lobster trap market (with 90 percent market share), its mesh is now becoming better known for security fences. The reason for this is Aquamesh is not only incredibly durable but also has such tiny openings that it is virtually impossible to scale or cut through. Now Riverdale sells “Wirewall”, which is just Aquamesh by another name. After the events of 9–11, Riverdale’s sales of Wirewall jumped tenfold (Crowley, 2002).

Creating new value in resources involves actions that leverage the effects of a resource bundle in new ways. Empirical evidence is consistent with this. Studies suggest that entrepreneurial firms tend to use resources for purposes for which they were not originally designed (Baker and Nelson, 2005). Technology historians stress that history is full of examples of technologies that were initially thought to be junk, but that were subsequently turned into important new products (Rosenberg, 1996, p. 95; Cattani, 2005, 2006). Creativity studies suggest one successful creative process is changing the utility of resources by connecting them to different users (Goldenberg et al., 2001). Levinthal (1998, p. 220) calls this “a quintessential entrepreneurial activity”, and

Sidney Winter (who uses the term “pre-adaptation” instead of exaptation) recently pointed out that when the histories of firms are investigated,

[I]t turns out, time after time, that the crucial investments occurred for reasons that were not clearly associated with a clear image of the course of the future in which these investments were going to pay off, in which they were going to be successful. Very frequently you see what the biologists call preadaptation, that is to say, that the capabilities and the orientations were put in place by causal forces or contingencies that had relatively little relation to the subsequent evolution in which those behaviors proved to be successful. (Murnann et al., 2003, p. 30).

Thus, instead of using resources adaptively, entrepreneurial firms might be better described as exaptive in their orientation, where exaptation describes the process of connecting a resource with a new domain of use (i.e. the creation of novel resource-stakeholder relationships). A key implication of this is that the mere existence of, or access to, resources is not enough by itself to explain the choices that a firm makes. Firms using causal/adaptive approaches make very different decisions about the value and use of resources than firms using an effectual/exaptive approach. By introducing exaptive variations, effectual entrepreneurs potentially create a broader and different range of variation than adaptation alone would create. Effectuation is explicitly exaptive in its orientation and is guaranteed to generate variation, however useful or valueless it may prove to be down the road. *Patterns* of exaptive variation generation may also be evident, suggesting a very different basis for modeling the evolution of firms than the common assumption that variation is random.

Exaptation and adaptation iterate as an entrepreneurial firm develops. As an initial chain of stakeholders is built, exaptations occur where resources are linked with new users, then adaptations that refine the firm’s product or service occur as more stakeholders are brought on board. Levinthal points to this exaptation–adaptation pattern in wireless technology. Wireless developed from initial applications in telegraphy, followed by broadcast radio, and then wireless telephony. Westinghouse built a brand new broadcast radio business on the back of a few weeks of research and a few thousand dollars to “exapt” a consumer broadcast radio set based on existing radio technologies it already had at hand. This was an extremely modest technological shift at affordable loss, but a significant leap in connecting radio to a new set of stakeholders. After its initial success with consumer radio, Westinghouse adapted its radio sets to meet the needs of its growing customer base better. This example illustrates that entrepreneurial behavior involves two overlapping sets of activities: a set of exaptations as well as a set of (more familiar) adaptations.

6. Conclusion

We have growing evidence that expert entrepreneurs behave effectually; that is, they act to fabricate their own environments (however locally) and futures (however short term) through self-selected stakeholder commitments that are embodied in new organizational goals and new market segments. Furthermore they seek to eschew predictive information to the extent possible. In this article, we have attempted to show how effectual action at the micro level also translates into firm behavior (a BTEF) that exhibits an exaptive rather than an adaptive orientation in its ecological interactions. We close this paper with a few modest suggestions for future research.

The first question concerns the role of exaptation in industry evolution. What would be the role of exaptive variations (as opposed to random variation) in ecological and evolutionary models of industries? While the literature on industry entry and evolution is vast, with few exceptions

(i.e., Geroski) very little of it considers the dual role that variance in firms and variance in the products offered by firms *together* play in industry evolution. One prediction of the BTEF is that heterogeneity in firms and product offerings will have patterns, and that exaptation will partially explain these patterns. Broadly speaking, exaptation means swapping the study of historical lineage of artifacts for a study of the process of exaptive branching at particular points in time. Micro-level studies of the origins and early evolution of new industries might potentially be useful in understanding these branching patterns. Such studies might also start to wean research away from the practice of modeling variance as randomly generated by showing that variance is patterned. This echoes the concerns raised by scholars such as Weitzman (1998), Griliches and Mairesse (1999), who point out that while the assumption of random variation is robust enough for many modeling purposes, it sits uncomfortably alongside micro-level studies that suggest human creativity is definitely not a random process and that patterns of variation in fact do matter in firm, industry and technology evolution.

A second question concerns the relationship between “slack” and exaptation. What is the connection between organizational slack and exaptive behavior? A good starting point for this question might be to return to the biological literature on the role of so-called “redundancies” in biological organisms. Gould (2002) in particular notes that in many biological organisms there appear to be systematic redundancies, structural constraints and maladaptive features that point to the fact that, however beautiful a bird or tree might be, it is also full of sub-optimal solutions to the problems posed by evolution. These ideas have some provocative links to one of the central messages of the BTF: that management is a satisficing process full of good enough local solutions rather than a rational system full of global optima (Cyert and March, p. 99). Research in organizational behavior might therefore consider the relationship between organizational slack and exaptive behavior, perhaps starting with the idea that exaptation is premised on slack of some kind, suggesting slack, entrepreneurial play and exaptation might be conjoined in some interesting ways. In particular, the notion that exaptation depends on putting given artifacts into a new context might suggest that having enough slack in organizations for some entrepreneurial “fooling around” with novel stakeholder combinations may be a useful organizational strategy.

A third question concerns the notion of entrepreneurship as a dual design project. How should we best understand the dual entrepreneurial project of designing both firms and markets? In this paper we earlier emphasized that the two key institutions of capitalist societies, firms and markets, are not assumed as givens in entrepreneurship. In evolutionary and ecological models of industries, markets are considered selection engines, and firms are hypothesized as the varied units being selected. Both of these critical evolutionary mechanisms, selection and variation processes, are design tasks for the entrepreneur, yet very commonly, and across a variety of research fields, variations remain unexplained without a behavioral lens, and these unexplained variations are tested with selection processes that are merely assumed. Some researchers have pointed out the co-evolution of markets and firms (Murmann et al.). Our approach suggests there is more meat to the behavioral bone. In sum, equilibrium views optimize on a given environment while ecological views adaptively respond and co-evolve with a changing environment (through adaptive and Lamarckian learning), but effectual behavior takes a reverse-Lamarckian approach, as suggested by Lewontin (1992):

We must replace the adaptationist view of life with a constructionist one. It is not that organisms find environments and either adapt themselves to the environments or die. They actually *construct* their environment out of bits and pieces. (p. 86).

In entrepreneurship, this reverse-Lamarckianism translates into the creation of new markets as opposed to leadership within existing (causal/equilibrium approach) or adaptation to given but changing markets (ecological approach). Research in marketing (Carpenter and Nakamoto, 1989) and economic institutionalism (McMillan, 2002) has already embraced this point of view by stressing the role of firms in designing the shape of consumer demand and the role of entrepreneurs in “bottom-up” market design. Our conjecture is that this is merely the first step towards understanding these design processes, and we hope that a BTEF based on effectual logic would suggest micro-foundations for how firms shape demand and construct new markets.

The study of entrepreneurship today is very much plagued by the same problems that the study of organizations faced when Cyert and March wrote their landmark book. For example, they write:

When we leave the area of the firm, we are likely to hear with impressive frequency that the structure, position, task, or history of a certain organization is unique (p. 287).

This is a refrain very familiar to entrepreneurship scholars who seek to identify and understand regularities in the decisions and actions involved in the early histories of entrepreneurial firms, but we take heart from the challenge that Cyert and March presented to researchers of their time:

What we tend to forget is that uniqueness in this sense is not an attribute of the organization alone; it is an attribute of the organization and our theory of organizations. An organization is unique when we have failed to develop a theory that will make it nonunique. Thus, uniqueness is less a bar to future theoretical success than a confession of past theoretical failure. (p. 287)

In fact, we could ask for no better argument to justify our own investment in attempts to develop a behavioral theory of the entrepreneurial firm.

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