Accounting for the future: Psychological aspects of effectual entrepreneurship

Abstract

Recent attempts to study entrepreneurship as a form of expertise, rather than a collection of traits and abilities have led to the development of the theory of *effectuation*. Effectuation is a sequence of *non-predictive* strategies in dynamic problem-solving that is primarily *means-driven*, where goals emerge as a consequence of *stakeholder commitments* rather than vice versa. Most important, effectuation isolates, identifies, and exploits techniques that *seek to control the future* without having to predict it. In this paper we (1) bring effectuation to psychology; (2) develop it further by examining key behavioral constructs that make effectual action possible; and, (3) derive possible implications for future research in psychology, particularly in relation to a more pluralistic understanding of human rationality.

Few other groups of human beings have been singled out in as many studies and scrutinized *as a group* for psychological differences from other human beings as the group consisting of entrepreneurs. Entrepreneurs have been compared with non-entrepreneurs in general (Venkatapathy, 1983; Ahmed, 1985; Allinson, Chell et. al., 2000; Carter, Gartner, et. al., 2003), as also with particular groups such as managers (Brockhaus, 1980; Miner, Smith et. al,, 1989), bankers (Sarasvathy, Simon, et. al., 1998), sociopaths (Winslow, 1987), and mountaineers (DeLeo, 1982). It is almost as though entrepreneurship is a branch of abnormal psychology. This rather begs the question as to why entrepreneurs are hypothesized to be different from other human beings in the first place, any more than accountants or astronauts are. Yet the studies that sort the world into entrepreneurs and non-entrepreneurs do not address this question. This is even more puzzling in light of the fact that very few significant differences are actually found in most of these studies, and many findings are contradicted over multiple studies. Rare exceptions include levels of self-efficacy (e.g. Chen, Greene & Crick, 1998), and risk aversion (Stewart & Roth, 2001). Even here it is not clear that one would not find similar differences in self-efficacy and risk-taking between *any* group of socially esteemed professionals and the general population – say, lawyers and non-lawyers, or musicians and non-musicians.

Recently, in light of the relative non-results of the studies of psychological differences between entrepreneurs and non-entrepreneurs, scholars have argued that both person and situation matter (Bouchikhi, 1993; Shane & Venkataraman, 2000). Among others, one stream of psychology that studies person and domain together is the expert-novice literature. Drawing upon this literature, a recent set of studies has re-formulated entrepreneurship as a form of expertise and entrepreneurs as a subset of experts in general (Sarasvathy & Simon, 2000; Sarasvathy 2001a & b; Read, Wiltbank, et. al. 2003). It turns out that expert entrepreneurs

exhibit significant similarities in how they model decision problems and the processes they use to solve them. These similarities are present, irrespective of differences in the technological and market domains within which expert entrepreneurs have built up their *entrepreneurial* expertise. In particular, the evidence shows that expert entrepreneurs overwhelmingly select an effectual mode of action and reasoning as opposed to causal modes. In this paper we explain what effectuation consists of and examine in detail the psychological elements that may underlie effectual entrepreneurship with a view to designing more fine-grained experiments and field studies in entrepreneurship in the best traditions of research in psychology. We conclude the paper with some bold speculations as to what the implications of these findings from entrepreneurship may be for research in psychology.

In sum, we hope to accomplish three things in this paper:

- Bring to psychology the findings from studies of entrepreneurial expertise, particularly the theory of effectuation.
- Develop the theory of effectuation further by examining key behavioral constructs that make effectual action possible.
- Derive possible implications for psychology, given what we have learned about how effectual entrepreneurs create firms and markets.

Findings from a study of entrepreneurial expertise: Effectuation

Before we describe the findings from the study of entrepreneurial expertise, we would like to clarify the connections we see between entrepreneurial expertise and expertise in general. In keeping with the literature, we think of an expert as "someone who has attained a high level of performance in the domain as a result of years of experience" (Foley & Hart, 1992). Investigation of expert performance began in earnest approximately 30 years ago, driven largely by a desire to understand the nature of a chess master (Chase & Simon, 1973; Simon & Chase 1973), though de Groot had been thinking about the topic since 1946 (de Groot, 1978). In their

early investigation of expert chess players, Chase and Simon quickly became aware that simple intelligence was not a guarantee of mastery of chess. More complex factors in the development of expertise revolved around how players stored information, perceived problems and generated solutions.

Following (Mieg, 2001), we classify entrepreneurial expertise as a form of "strong-form" expertise that is associated with deep personal ability and knowledge that has been derived from extensive practice and experience. This is in contrast to "weak-form expertise," that is associated with forecasting that can be done through computer models and simulations or through insider information. Furthermore, we are fully in agreement with the position that expertise is contextual (Ericsson & Smith, 1991). While a neurosurgeon's talents may be unsurpassed in the operating room, her abilities there predict nothing about her abilities in the grocery store, on the computer or solving physics problems. As such, expertise research tests experts in their own context, and the results we bring to our discussion here are based on an extensive study that is fully rooted in the context of entrepreneur's approaches to *entrepreneurial* problems as opposed to problems in particular domains of business, industry, or technology.

In an initial foray into this topic, (Sarasvathy, 2001b) used a 17-page problem set consisting of ten typical problems that arise in transforming an idea into a business. Results were based on protocol analysis to isolate and identify commonalities in the decision-making processes of 27 expert entrepreneurs. These entrepreneurs were founders of companies ranging in size from $200 M to $6.5 B, and were taken from a random sample of a population of 145 founder-entrepreneur volunteers that met the criteria for expertise based on the literature. Thus the sample drawn was based on characteristics of the expertise of the entrepreneurs as opposed to characteristics of the firms they founded or the level of financial success they achieved.

Moreover, the final sample of *firms* that resulted through the choice of subjects contained a wide variety of industries and technologies ranging from retail products and services to traditional technologies such as railroad and steel and more recent ones such as semi-conductors, software and life sciences.

The base model of entrepreneurial expertise, called "effectuation" (to signify the *inverse* of causation), was extracted through a variety of qualitative and quantitative analyses of the think-aloud verbal protocols in the tradition of (Ericsson & Simon, 1984). For a detailed description of the analyses and a comprehensive exposition of the model, see (Sarasvathy, 2001a & b). Here we briefly describe the ensuing theory and explore its connections with and implications for future research in entrepreneurship as well as for studies of human behavior in general in the larger field of psychology.

What is effectuation?

Effectuation is a sequence of *non-predictive* strategies in dynamic problem-solving that is primarily *means-driven*, where goals emerge as a consequence of *stakeholder commitments* rather than vice versa. Most important, effectuation isolates, identifies, and exploits techniques that *seek to control the future* without having to predict it.

Hence the key to effectuation lies in our ontological stance toward the future. The simple but familiar device consisting of urns and balls used to describe statistical distributions should clarify this stance. In particular, the example we use here is due to Frank H. Knight, who argued in his seminal *Risk, Uncertainty, and Profit,* that the existence of and justification for entrepreneurial profit was entirely due to the existence of "true" uncertainty (Kinght, 1921). Knight divided unknown distributions of the future into three types:

(In each of the following cases imagine a game where if you draw a red ball, you win $50)

(1) Risk – Known distribution, unknown draw:

The urn contains 5 red balls and 5 green balls. In this case the expected value ($25) of any draw is perfectly calculable through standard statistical analysis.

(2) *Uncertainty – Unknown distribution, unknown draw:*
We do not know how many balls are in the urn or of what colors. Here we need to estimate the distribution over several draws before we can place our bets with any degree of confidence.

(3) *"True" or Knightian uncertainty – Distribution does not exist and/or is unknowable:*
Each draw brings forth a different item, not limited to balls – in other words, we just simply do not know and cannot estimate what the urn contains. It is here that we need a non-predictive technique to make decisions. Effectuation suggests that one solution to this problem lies in understanding that this distribution is *created* through human action; hence, *harnessing* human action through a process of persuasion[1] is likely to prove more useful than *predicting* it.

Effectuation brings into stark relief the predominant ontological stance of most of the literature on decision-making under uncertainty. Efforts in this stream of research have almost exclusively been dedicated to causal analyses that lead to improved predictions precisely because good prediction allows us to capitalize on our expectations regarding the future. But focusing so much on causal, and hence, predictive aspects, we have mostly neglected the study of techniques of control that do not require us to predict the future. Take for example, Kahneman and Lovallo's pitiful head-shaking at the folly of human attitudes to the future that lead to "timid choices and bold forecasts." The authors simply assume that subjects should always approach the future as predictable, and confidently prescribe "corrective" actions that need to be taken to "overcome the biases" and achieve "optimal behavior in every situation" (Kahneman & Lovallo, 1993). We agree with Kahneman and Lovallo that there are several circumstances where people disregard predictive information, sometimes leading to over-optimism in their forecasts, and sometimes to exaggerated risk-aversion. 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

[1] This persuasion is bi-directional – i.e. both leader and member are persuadable and persuasive. That is why, as we explain later, flexibility of goals is such an important aspect of effectuation.

or social artifacts. In his seminal book, *Sciences of the Artificial,* (Simon, 1996) forcefully argues this point:

> *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.*

One of the most telling examples of a domain where the future may be truly unknowable is the introduction of a new product in a new market; the "suicide" quadrant in Figure 1. In commercializing new technologies, pioneering entrepreneurs often find that formal market research and expert forecasts, however sophisticated in their methods and impeccable in their analyses, fail to predict where the markets will turn out to be, or what new markets will come into existence. Christensen (1997), Mintzberg (1994) and others have documented a wide variety of cases that illustrate this unpredictability in business. Human history also attests to this unpredictability in other areas – such as Columbus' discovery of the New World, the fall of the Berlin Wall, or the organization of Mothers Against Drunk Driving. In each of these cases, causal maps were either non-existent, or less useful than effectual action.

But even in more mundane businesses such as ice cream (Lager, 1994) or real estate (Corcoran & Littlefield, 2003), means-driven non-predictive strategies have enabled entrepreneurs such as Ben Cohen, Jerry Greenfield and Barbara Corcoran to create new niches and new ways of doing business that turned out to be highly profitable. Both enterprises were spun from the narrow silk of who the founders were, what they knew and whom they knew, and negotiated into widening webs of loyal stakeholders who actively participated in what was to come, and were not merely passive harbingers of the entrepreneurs' good fortunes. Ben & Jerry, for example, started an ice-cream shop in Vermont because there was little else they knew how to do. And they paid stakeholders, plumbers and pianists alike, with coupons for free ice cream

and the chance to participate in a variety of "hippie-style" causes, from the purity of the ingredients in the product to the purity of the environment at large. Barbara Corcoran quit her job as a diner waitress and with a $1,000 investment from her boyfriend, started a real estate firm in New York and grew it into a $2 Billion business. In a recent book advocating lessons learned from her experience, she lists such effectual principles as, "If you don't have big breasts, put ribbons on your pigtails" and "It's your game, make up your own rules" – emphasizing both the means-driven and non-predictive control aspects of effectuation. Not only in the bromides of successful entrepreneurs, but in a wide variety of actual strategies used in the histories of new ventures, we find evidence that entrepreneurs, whether they ultimately succeed or not, do behave as though human action shapes future outcomes, rather than as though outcomes could be predicted and those predictions exploited. Table 1 provides a quick list of contrasting elements in the two approaches as they are manifest in entrepreneurial phenomena.

But the high unpredictability of the entrepreneurial setting provides only one side of the coin that validates the use of effectuation. Behavioral aspects necessarily form the other side. Thus far studies based on effectuation have not examined what types of actors or human behaviors lead to effectual action. We will now turn to explicating that and trace how those behaviors are embedded in the effectual process through which new social artifacts come to be. Figure 2 shows the person/situation antecedents of effectuation and Figure 3 shows the dynamic process through which the social artifact is fabricated.

Three psychological elements underlying the key components of effectuation

There are at least three key components (Non-predictive control, Means-driven strategies, and Stakeholder commitments) that constitute effectuation, each of which has a fundamental

behavioral construct (self-efficacy, creativity, and docility) embedded in it. The behavioral constructs help push forward the process that fashions the possible world of the effectual artifact from the actual world in which the effectuator finds himself or herself (Figure 3). We will now examine these behavioral constructs one by one and show why each is necessary for effectual action.

Self-efficacy.

Wood & Bandura (1989) define self-efficacy as "beliefs in one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands." In a more recent effort, Gist & Mitchell (1992) conceptualized it as "a person's estimate of his or her capacity to orchestrate performance on a specific task" In both definitions, the construct of self-efficacy is directly related to particular tasks and not generalized as an over-arching and unvarying personality trait. In this sense, self-efficacy is a narrower and more context-specific construct than locus of control. As Gist puts it, "internal versus external locus of control is a generalized construct covering a variety of situations, whereas self-efficacy is task-specific, examining the individual's conviction that he or she can perform a specific task at a specific level of expertise (Gist, 1987). In other words, as Bandura (1977) argued, an individual with a high internal locus of control in general may still exhibit low self-efficacy on particular tasks.

While the traits literature in entrepreneurship has largely been inconclusive, self-efficacy has recently been shown to be a more useful explanatory factor in understanding entrepreneurial intentions, behavior, and performance (Chandler & Jansen, 1992; Chen, Greene, et al. 1998). The notion of self-efficacy is also better aligned with our notion of studying entrepreneurship as a form of expertise, rather than a personality trait, or an innate ability. Effectuation not only

presupposes that the entrepreneur has the required level of self-efficacy with regard to the tasks involved in starting a business, but also suggests that as entrepreneurial experience increases, the entrepreneur's level of self-efficacy with regard to solving problems in the face of high environmental uncertainty and substantial goal ambiguity increases in the direction of bringing influential stakeholders on board.

Creativity.

Entrepreneurial expertise, like expertise in the arts and in scientific discovery, is essentially a form of creative expertise. In other words, creating a new firm or market is a subset of the larger phenomenon of novelty generation[2]. That is perhaps why entrepreneurship has often been assumed to be intractable – an art rather than a science. But considering entrepreneurship a subset of novelty generation in the world allows us to apply to it recent advances in creativity research based on cognitive science. Summarizing some of the most important advances in this regard, Simonton (2000) identifies four key areas of progress in understanding creativity: (1) insightful problem solving; (2) creative cognition; (3) expertise acquisition; and (4) computer simulation. All four approaches have helped demystify creativity by demonstrating that, "The optimal functioning embodied by creativity entails ordinary cognitive processes, and hence creative thought is accessible to almost anyone." Whether it is the role of the cognitive unconscious (Bowers, Farvolden et al., 1995; Schooler & Melcher, 1995), or visual imagery (Finke, Ward et al., 1992), or deliberate practice (Ericsson & Lehmann, 1996), creativity in a wide variety of domains involving open-ended problems has been shown to be rooted in the same mundane cognition that powers mental activity in our everyday life.

For entrepreneurship, this suggests that instead of looking for special types of individuals, it may be possible instead to teach a wide variety of individuals to harness their creativity in

[2] See Sarasvathy, 2000 for affirmation of this view by six eminent scholars in the field

building new ventures. As Sarasvathy (Sarasvathy, 2001a) argues, the focus of our research and pedagogy would shift from building *the* successful firm or identifying *the* successful entrepreneur to how individuals can *learn* to acquire and exploit entrepreneurial expertise that leverages who they are, what they know, and whom they know. In particular, the nature of *entrepreneurial* creativity and its relationship to particular domains of functional expertise such as particular technologies or markets would provide some new avenues for scholarship in the field.

Docility.

One of the major areas of theoretical discontent in stakeholder acquisition, retention and management has to do with behavioral assumptions about opportunism and trust. While economists insist on understanding the importance of contracts and their role in overcoming latent opportunism, sociologists harp on the embedded nature of trust in different types of ties in social networks and their role in legitimizing and enabling stakeholder interactions. But what we know about self-interest based on empirical evidence, (See Rabin, 1998 for a comprehensive review) both in the lab and in the field suggests the following:

1. People are not solely or even massively self-interested; nor are they entirely altruistic.
2. The same person may be altruistic at certain times and opportunistic at others. (Ex: Robber barons such as Andrew Carnegie)
3. People who are predominantly opportunistic in one domain may be concurrently altruistic in others (Ex: The Godfather)

Moreover, as Thompson (1998: 305) has suggested, social selection mechanisms favored by evolution have enabled human beings to become fairly astute in recognizing and acting upon cues for individual versus collectivistic behavior:

> *Because selection has sometimes favored individualistic and at other times collectivist behavior, the human species has evolved not only the capacity for both kinds of action but probably also a complex cognitive device for figuring out in a given situation which kind of action, collective or individualistic, is likely to produce the best genetic outcome.*

Arguing in a similar vein, Simon developed the idea of *docility* as a fundamental behavioral construct (Simon, 1993), one that we believe is central to the theory of effectuation. Simon defined "docility" as: *The tendency to depend on suggestions, recommendation, persuasion, and information obtained through social channels as a major basis of choice.* (Simon 1993: 156) Docility follows directly from the limitations of human cognition – i.e. that as a species, we are at best, boundedly rational. Simon developed a notion of "intelligent" altruism based on this view of docility to argue that bounded rationality not only limits our ability to undertake the computational demands of highly opportunistic behavior, but also selects such behavior out (in an evolutionary sense) and selects in those who are willing and able to depend on others and help sustain others in a group.

The construct of docility – i.e. the idea that *all* human beings are docile to varying degrees, plays a large part in how effectual entrepreneurs accumulate stakeholder commitments. Since effectuation operates in the face of massive unpredictability and goal ambiguity, effectual entrepreneurs seek to control the future through stakeholder commitments. But because both entrepreneurs and stakeholders are docile, they are able to negotiate specific pieces of the future that come to be by trading off each others preferences in exchange for commitments and also forge new preferences and goals in the process. We examine this *process* in more detail next and explicate how the behavioral constructs underlying the components of effectuation drive its dynamics.

How the three psychological elements drive the dynamics of effectuation

Figure 3 describes the process through which the effectual entrepreneur transforms an idea into a social artifact in the face of substantial external unpredictability, and considerable internal goal ambiguity. The effectuator is modeled at all times as a bundle of primitives

consisting of who he is, what he knows and whom he knows. Who he is consists of a collection of tastes, traits, values and abilities; what he knows includes the knowledge corridors he is in; and whom he knows is embodied in the social networks he is a part of. It is important to note here that each of these primitives may be relatively stable in the short run but is liable to change over time. No assumption is made with regard to the structure or intensity of any of these primitives except to note that they are mutable to varying degrees at various times. In other words, at any given point in time, an individual may have some clear and ordered preferences and some vague and unarticulated aspirations. Similarly, he or she might have certain areas of knowledge and experience, but be capable of others that may be latent or non-existent. Their networks may consist both of strong and weak ties, and in some cases they may find themselves in garbage cans[3] (March. 1994).

The existence of variation in structure and intensity of these primitive elements of the constitution of individuals makes trading in these very same elements possible. For example, the fact that some stakeholder preferences are vague and malleable means that the entrepreneur can shape those malleable preferences to align with key stakeholders' strong ones so that the two can reach agreement on what the world should look like. And vice versa. Furthermore, to the extent that there is diversity in knowledge bases and both weak and strong ties in networks, entrepreneurs and stakeholders can interact and negotiate new combinations of knowledge and social influence that can lead to true novelty – something neither party may be able to predict or even imagine *a priori.* The existence of docility, therefore, enables the creative trade between individual efficacies to generate new possibilities for the world. And this process of re-creating

[3] Garbage cans refer to places of routine gatherings where one may or may not meet strangers. Examples include conferences, churches, and airports.

the world operates through the commitments that each stakeholder brings to the table as cost and price for the negotiations.

Figure 3 traces this process as follows: Based on who she is, what she knows, and whom she knows, the effectuator generates a set of possible actions (actions for which she has high levels of self-efficacy) and starts interacting with people in her environment. Because both she and her potential stakeholders are docile, they are able to 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 are 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). But 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 become more clearly defined and less flexible as the social artifact coalesces into being.

In this effectual process, the social artifact, whether a firm or market or organization or institution becomes in many cases an embodiment of novelty, taking on a shape often unanticipated and sometimes even unimagined by the stakeholders whose commitments actually gave birth to it. For a detailed empirical examination how this process worked in the creation of the RFID industry, see Dew (2003). We posit that case studies and early stage histories of most successful entrepreneurial ventures, whether in the for-profit or social sectors should provide

compelling evidence for how this process operates and why it leads to novelty, without resorting to explanations based either on mysterious intuitions, super-normal foresight, or meaningless random walks.

Figure 4 integrates our discussion thus far into a typology of problem-solving strategies organized along the two differing assumptions about the (1) predictability, and (2) controllability of the future. In essence, when we believe the future is highly predictable, we either try to avoid negative outcomes (risk-averse strategies), or use our predictions to control the future using scientific strategies. Examples of the former include portfolio diversification in finance or preventive health care. Examples of the latter include a variety of new technologies such as air-conditioning and medical treatments. High-prediction strategies work well in natural environments or at the population level of analysis in human behavior. In social environments, where individual, and group-level behaviors matter most, we need strategies that do not fatally depend on predictive calculi. In other words, when we believe the future is not very predictable, we either; (1) try to adapt to a changing environment – i.e. take up boundary scanning activities, seek and use iterative feedback, learn to imitate our best competitors, etc. – or (2) effectuate a new environment – i.e. actively seek to influence, enact and even re-create our environment through stakeholder commitments.

What effectual entrepreneurship implies for psychology – a pluralistic view of rationality

In sum, while effectuation provides a strong theoretical explanation for how entrepreneurs create social artifacts, some of which lead to substantial economic impact, understanding the psychological elements that drive effectual processes is crucial to push the field farther, both in terms of shoring up and testing more fine-grained hypotheses as well as

relating the theory to practical implications for the classroom and public policy. With a view to moving forward the conversation in that direction, we have shown here that extant work in psychology on self-efficacy, creativity and docility, can bring useful light to bear on the underlying components and processes of effectuation. Now we turn to the more risky task of trying to lay out what implications the existence of effectuation has for some key debates in psychology. In particular, we hope to contribute to the old and continuing conversation on rationality that once again occupies center-stage in recent discussions in psychology (e.g. Goldstein & Gigerenzer, 2002; Todd & Gigerenzer, 2003, behavioral economics, (Russell & Thaler, 1985; Sen, 1993) and social philosophy (Joas, 1996). In particular, Gigerenzer and his colleagues have been exhorting us to formulate the notion of "ecological" rationality in addition to more traditional notions of causal or predictive rationality. In pluralizing the notion of rationality, we might want to consider not two, but three types of rationality, the third being something barely emergent out of the empirical works of eminent scholars such as Kahneman, Tversky, Slovic, Thaler and others, and yet rooted in the Pragmatist philosophy of the forefather of psychology, William James.

Rationality: Causal, Ecological, and Effectual?

In his award address at the 102nd Annual Convention of the American Psychological Association, Paul Slovic (1995) introduced us (metaphorically) to three baseball umpires – who serve as perfect ambassadors for the three views of rationality that we plan to discuss below:

- "I call them as I see them," says the first;
- "I call them as they are," claims the second; and,
- "They ain't nothing till I call them," argues the third.

In his interactions with the world, the first umpire relies on careful observation; the second, on direct experience; while the third strives to construct it. Slovic goes on to affirm and discuss the

third in particular; many of his arguments, applied to empirical work in entrepreneurship, form the basis of inspiration for our claims in this paper so far.

If we translate the three umpires into ontological bases for different types of rationality – i.e. different ways to act upon the world and reason about it – our thesis might look somewhat like this in snapshot:

Causal: The actual world is one of many possible worlds – let's learn to pick the best one.

Ecological: The actual world is the only one that matters – let's make the best of it.

Effectual: All possible worlds lie within the actual[4] – let's create new ones.

Without venturing too far into the treacherous waters of a philosophical debate, we would like to briefly describe each type of rationality within the restrictions of our domain of interest – i.e. entrepreneurial expertise as a subset of human problem solving. In this narrow domain, the three views of rationality take three different forms of problem structure, particularly in the structure of *constraints*. Further, they imply different strategies with regard to dealing with those constraints.

Todd & Gigerenzer (2003), describe the nature and role of constraints in the case of traditional (causal) rationality as follows:

> *The traditional view has been that we are hemmed in by two unrelated sets of bounds: purely external ones, such as the costs of searching for information in the world, and, independently, purely internal constraints, such as limits on the speed with which we can process information and limits on the amount of information we can hold in working memory (e.g., Simon, 1981, Chapter 3). Given these constraints, bounded rationality can be seen either as the attempt to do as well as possible given the demands of the world – the notion of optimization under constraints – or as the suboptimal outcome of the limited cognitive system – the realm of irrationality and cognitive illusions.*

They then go on to explicate the same for ecological rationality:

> *These two blades – the two sources of bounds on our rationality – must fit together closely for rationality to cut. While the external bounds may be more or less immutable from the actor's standpoint, the internal bounds comprising the capacities of the cognitive system can be shaped,*

[4] This is a direct quote from Nelson Goodman's *Fact, Fiction and Forecast*.

for instance by evolution or development, to take advantage of the structure of the external environment (Todd, 2001). From this perspective, then, we can see bounded rationality as the positive outcome of the two types of bounds fitting together. 1 In other words, humans exhibit ecological rationality (Gigerenzer, Todd, & the ABC Research Group, 1999; Todd & Gigerenzer, 2000; Todd, Fiddick, & Krauss, 2000) – making good decisions with mental mechanisms whose internal structure can exploit the external information structures available in the environment.

In other words, while causal rationality seeks to find the best possible world *given* internal and external constraints that limit its achievement of this optimal objective, ecological rationality seeks to make the most of the actual world by trading off these constraints against each other – either through evolution or Lamarckian learning. Effectual action, in its turn, pushes this trade-off further to stand the notion of "constraint" on its head, modeling it as "opportunity" – not to create new ways to achieve given ends, but to create new ends – some good, others bad, but all in line with a variety of human aspirations that change over time. The effectual actor seeks to solve *several* distinct problems in the *absence* of firm trade-offs or values, a la the decision maker in Krantz (1991)[5] who argues, "The normative assumption that people *should* maximize *some* quantity may be wrong… People do and should act as *problem solvers, not maximizers,* because they have many different and incommensurable… goals to achieve." Effectuation, as a theory, examines and explains *how* people come to have a variety of goals and how these diverse and even conflicting goals may change and converge over time into commitments to particular projects that end up re-creating the world through new social artifacts.

Gregory, Lichtenstein, et. al. (1993) argued that while traditional scholars of rationality dig like archaeologists to "uncover" pre-existing preferences and values, scholars of a rationality based on constructed preferences would function as architects, "working to build a defensible expression of value." So too the effectual entrepreneur does not undertake formal market research to *discover* the shape of a pre-existent or latent market; instead he or she seeks to

[5] This passage is also quoted in Slovic (1995)

negotiate stable structures through stakeholder commitments that eventually get stitched together into a market. Similarly, effectuation differs also from adaptationist views of the market. As Lewontin (1992) has argued so well, "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." Effectuation, we suggest, is what Lewontin calls *a reverse-Lamarckian position*. "Whereas Lamarck supposed that changes in the external world would cause changes in the internal structure, we see that the reverse is true."

Effectual rationality, were we to try to model it as a form of rationality, would begin with *actions* and *interactions between actors* as the only primitives. More traditional primitives such as preferences, networks, and constraints (both positive and negative) would at best be only partially determined and labile to varying degrees over time. The central phenomenon in such a view of rationality would be: **Given individuals with high *docility* and high levels of *self-efficacy* in overlapping domains, what types of effectual strategies, techniques, and processes can they use to *create* what types of social artifacts?** When we look at the tremendous amount of work done by decision research scholars over the past two decades and more, and consider what it would take to build models of effectual problem solving in entrepreneurship or elsewhere, we agree with Slovic that we "will require choice models of far greater complexity than traditional models." As a first step in this rather daunting endeavor, we would like to propose a series of questions in several sub-areas of research in psychology that have overlap with, and therefore may be impacted by theorizing about effectuation.

Persuasion and influence: Social psychology has a long history of studying persuasion in one form or another. But whether it is Triplett's 1898 thesis about the role of competition in

influencing the performance of bicycle racers, the Asch experiments of insidious social influence, The Milgram experiment of the influence of authority in and out of uniform, or Cialdini's work on market-based influence such as in advertising and sales techniques, a large part of this work appears to focus on a rather confrontational view of persuasion – i.e. persuading someone against their will and against what is "good" for them. In fact, the entire area in replete with metaphors of confrontation and even war. Note for example, the opening paragraph of a recent paper by Sagarin, Cialdini, et. al. (2002: 526), "In martial arts training, instructors spend as much time teaching defensive techniques—blocks, deflections, parries—as they do teaching tactics of attack. On the social influence battlefield, however, researchers have expended much more effort investigating forms of persuasive attack than of defense. As a result, influence professionals can draw from a varied arsenal of weapons of influence whose effectiveness has been experimentally established…"

Effectuation, as we have noted earlier, draws instead upon *docility* as a positive quality in individuals. Because docility goes both ways in every interaction, it is a particularly useful construct to study situations of high goal ambiguity where individuals have highly labile preferences. When both parties to a transaction are docile (i.e. persuasive *and* persuadable), they can trade and mould each others' non-overlapping preferences and construct mutually acceptable goals that leverage overlapping preferences. How this process may actually work in particular domains would form an interesting area of inquiry within the larger rubric not only of persuasion and influence, but also research areas such as goal setting and leadership.

Negotiations and conflict resolution. Negotiation research too operationalizes its central phenomenon as a confrontational, rather than a co-operative endeavor. Carneval & Pruitt (1992) for example defined negotiation as the process by which two or more parties attempt to resolve a

perceived divergence of interest in order to avoid social conflict. But as effectual entrepreneurs recognize, negotiation could also consist of processes that build consensus about future unknowns, thereby reducing the need to predict and increasing the possibility of novelty generation. In order to study this phenomenon, it might be necessary to find theories that talk about negotiation within contexts of uncertainty where both negotiators and contexts are taken to be interactive.

It is only very recently that negotiation researchers have begun a foray into such a thicket of possibilities. As Bazerman, Curhan, et. al. point out in the 2000 Annual Review of Psychology on negotiation research, "Much of the work on negotiation assumes that the structure of a negotiation is exogenous to the parties and that the cognition and affect of the parties is exogenous to the structure. But work on mental models of negotiation suggests that the parties' perceptions of the negotiation structure are critical and endogenous to the negotiation and that, similarly, the cognition and affect of the parties are critical and endogenous to the negotiation." They go on to define what they mean by a mental model, "This paper defines a mental model as a cognitive representation of the expected negotiation, a representation that encompasses understanding of the self, negotiator relationships, attributions about the other, and perceptions and knowledge of the bargaining structure and process. Mental models can be studied as individually held cognitive concepts or as shared definitions that develop interactively."

It seems rather obvious that a fruitful line of research based on effectuation could be built on the nature and role of mental models that operate in domains where the parties to the negotiation use control rather than prediction as the primary basis for their choices. A further area of research could develop the relationships between particular mental models that map negotiations about the *shape and structure* of the social artifact onto actual outcomes due to the

social artifact down the road. Once again, since effectual negotiations occur in contexts of goal ambiguity and involve docile actors persuading each other what bits and pieces of the artifact should look like, this research would impact work in goal setting and leadership as well as negotiations and conflict resolution.

In particular, the distinction between creativity goals and productivity goals – i.e. goals that have to do with shaping the artifact rather than shaping outcomes to the artifact may be an interesting distinction in studying how effectual entrepreneurs create new markets and organizations. For example, Shalley (1991) found that "when individuals are given a productivity goal or low personal discretion[6] and no creativity goal, creativity decreases." The role of control has been examined in studies of risk perception and risk management (Ahmad, Mohamad, et. al., 2002), but has received less attention in the context of creative problem solving – a gap that would be useful to bridge in the context of effectual action.

We have outlined above at least two areas of psychology research where we could ask some new questions through an effectual perspective. At the least, we could add a new focus to studies in these areas by specifically targeting contexts of high unpredictability combined with high goal ambiguity. Presumably, we could find several other areas of research in psychology that would benefit from an effectual perspective, as well as help us understand how effectual action creates new social artifacts. For example, there are several puzzles and paradoxes in mathematical psychology, such as the hyperbolic time discounting function (Herrnstein, 1990) and human beings' perceptions of certainty (Windschitl & Weber, 1999), that may have explanations rooted in how human beings perceive the predictability and controllability of the future. We believe that at this time we have merely begun to skim the surface of possibilities with regard to an effectual psychology of control in the face of an unpredictable future.

[6] i.e., little control over the future.

Conclusion: Accounting for the future in psychology and society

In his 1990 book, *Acts of Meaning*, Jerome Bruner both indicted and gave hope to researchers in psychology as follows: "The wider intellectual community comes increasingly to ignore our [psychology] journals, which seem to outsiders principally to contain intellectually unsituated little studies, each a response to a handful of like little studies. Inside psychology, there is a worried restlessness about the state of our discipline, and the beginning of a new search for means of reformulating it. In spite of the prevailing ethos of "neat little studies," and of what Gordon Allport once called methodolatry, the great psychological questions are being raised once again -- questions about the nature of mind and its processes, questions about how we construct our meanings and our realities, questions about the shaping of mind by history and culture." In this paper, we believe that we have brought attention to a phenomenon that might be part of such a great psychological question. Although the work that inspired our larger curiosity arose in the specialized domain of entrepreneurial expertise, we have taken a rather bold leap of faith in attempting to juxtapose it against some of the leading contributions in psychology. We do this both to provoke the best efforts in psychology toward furthering research in entrepreneurship and to develop a more convincing accounting within psychology for the future of human beings and societies. In response to any charge that we may be overly presumptuous or just simply erroneous, we point to the upstart in every effectual entrepreneur, and remind ourselves the words of the forefather of psychology himself:

> Our errors are surely not such awfully solemn things. In a world where we are so certain to incur them in spite of all our caution, a certain lightness of heart seems healthier than this excessive nervousness on their behalf. At any rate, it seems the fittest thing for the empirical philosopher.
>
> -- *William James, The Will to Believe, pp. 19.*

TABLE 1: SUMMARY OF DIFFERENCES BETWEEN PREDICTION AND EFFECTUATION

ISSUE	CAUSAL OR PREDICTIVE POSITION	EFFECTUAL POSITION
View of the Future	**Prediction.** The future is a continuation of the past; can be acceptably predicted	**Creation.** The future is contingent on actions by willful agents
Givens	**Goals** are given	**Means** (Who I am, what I know, and whom I know) are given
Decision Agenda	What means ought I to accumulate to achieve these goals?	What effects can I create with the means I have?
Basis for Commitment	**Should.** Do what you ought to do -- based on analysis and maximization	**Can.** Do what you are able to do – based on imagination and satisficing
Basis for Taking Action	**Goals.** Let goals determine sub-goals, commitments, and actions	**Means.** Let stakeholder commitments and means determine sub-goals – goals emerge through aggregation of sub-goals
Predisposition Toward Risk	**Expected Return.** Calculate upside potential and pursue (risk adjusted) best opportunity	**Affordable Loss.** Calculate downside potential and risk no more than you can afford to lose
Attitude Toward Outside Firms	**Competition.** Constrain task relationships with customers and suppliers to what is necessary	**Partnership.** 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**

Figure 1: Example of a domain for effectuation

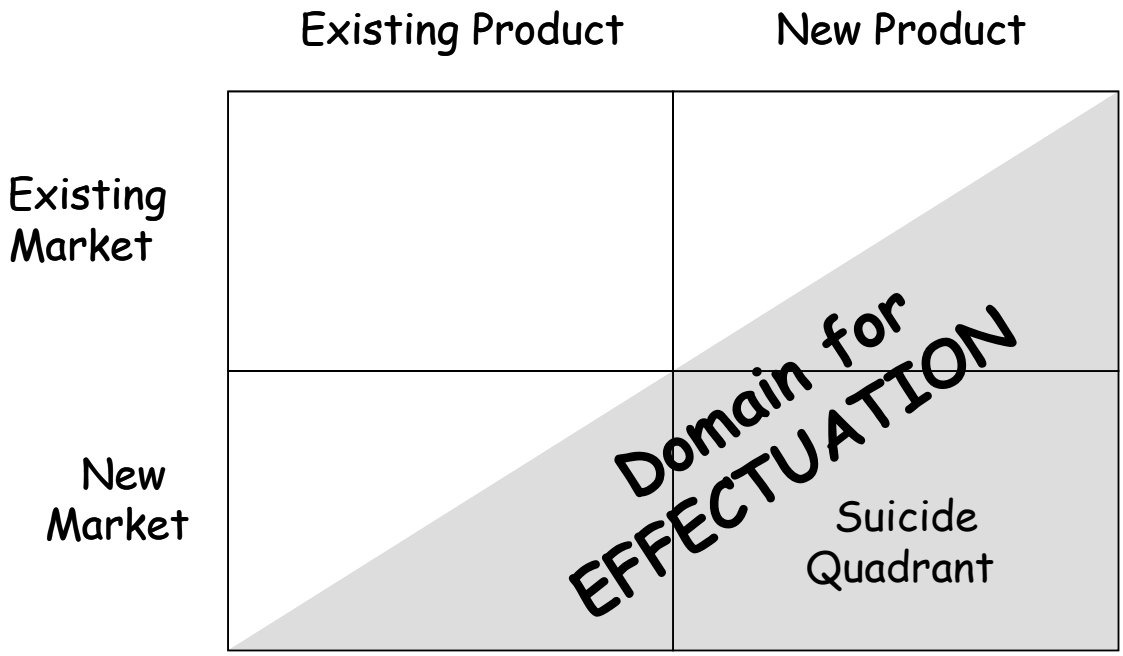
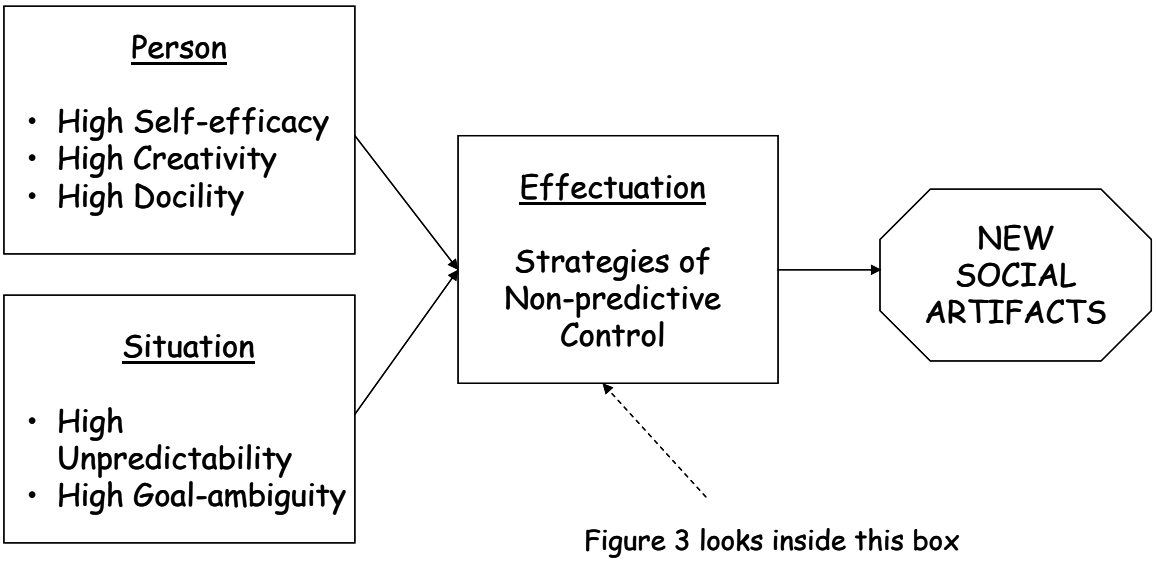


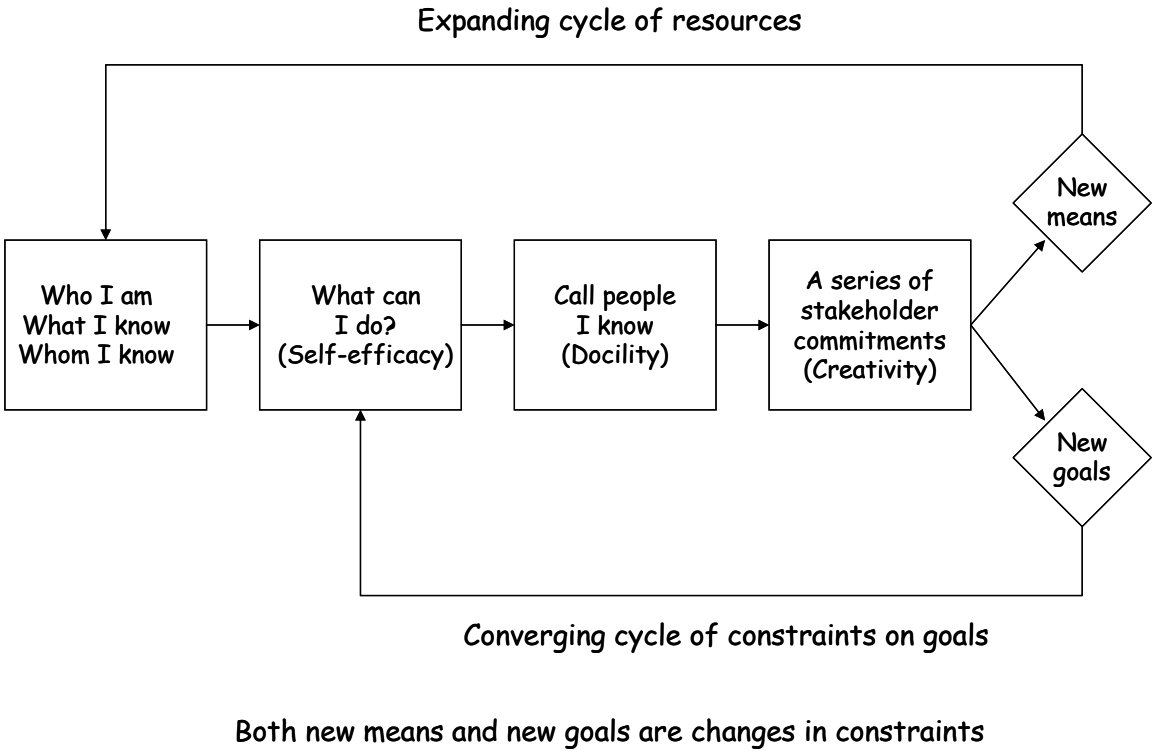
Figure 2: Effectual origins of social artifacts



The artifacts implement generalized human aspirations as particular ends and effects. E.g.

- The need to communicate is implemented as a software program called "Instant Messenger"
- The aspiration for a safer society is implemented as Mothers Against Drunk Driving.

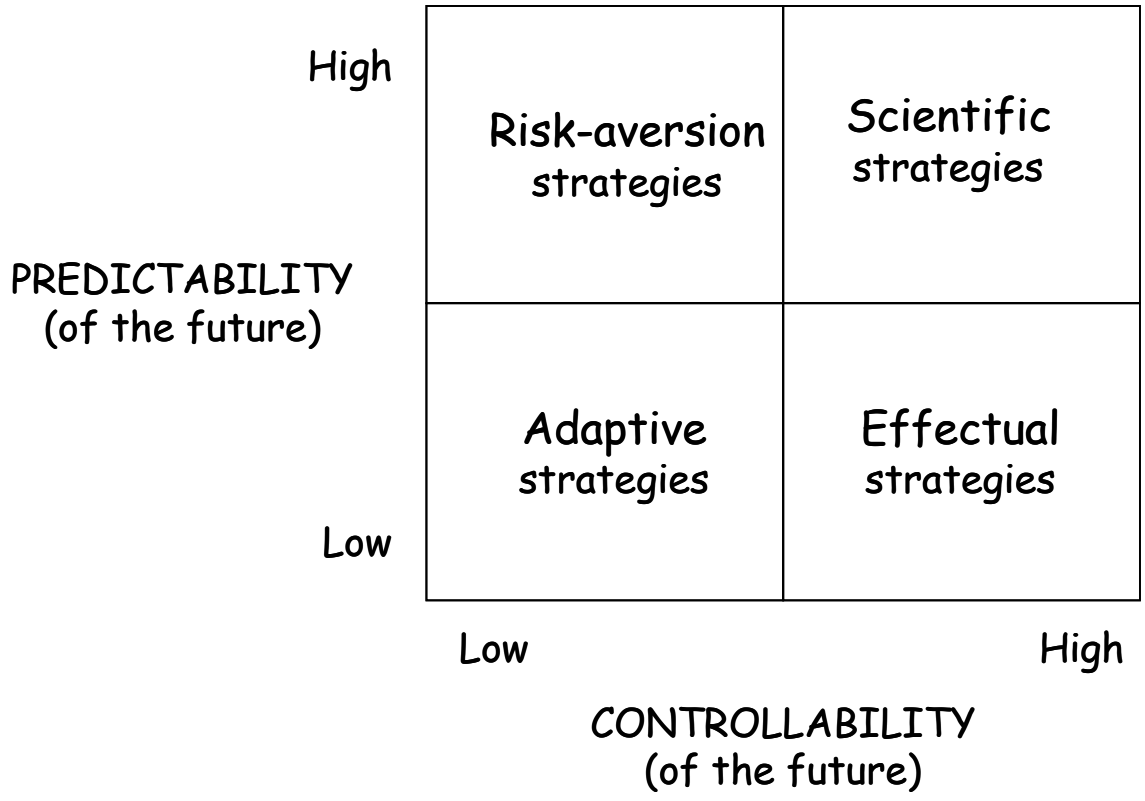
Figure 3: A dynamic model of the creation of new social artifacts through effectuation



As each stakeholder negotiates particular features of the artifact in exchange for committing resources, there are fewer and fewer areas of overlap for common goals. So the effectuation process converges into specific goals even as resources expand to implement them. This final combination of resources and goal implementations embodies the new social artifact that comes to be.

Figure 4:

Typology of problem-solving strategies with different assumptions about the future



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