EFFECTUAL REASONING IN ENTREPRENEURIAL DECISION MAKING: EXISTENCE AND BOUNDS

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INTRODUCTION

That entrepreneurs create firms is a simple fact. But that entrepreneurs often create firms in the *absence of markets* is an idea that is recently gaining ground with researchers (Shane & Venkataraman, 1999). The phenomenon is further complicated by the fact that much of the information required to bring new markets into existence itself does not come into existence until those markets are created (Arrow, 1974). In an attempt to tackle the issues raised by this central research question in entrepreneurship, Sarasvathy (2001) has proposed effectuation as the dominant decision model for entrepreneurial decision making, particularly in the absence of pre-existent markets. Through a verbal protocol study of 27 expert entrepreneurs, this paper establishes the existence of effectual reasoning in their cognitive processes and delineates the bounds between their use of causation and effectuation. In quantitative terms, over 63% of the subjects used effectuation more than 75% of the time.

EFFECTUATION AND ITS THEORETICAL PRECEDENTS

Effectuation is the inverse of causation. Effectual reasoning is not merely a deviation from causal reasoning. It is a distinct mode of reasoning based on an entirely separate logic than the logic behind causal reasoning. Causation models are based on the logic of prediction, i.e., *to the extent that you can predict the future, you can control it.* Effectuation, instead, is based on a logic of control, i.e., *to the extent that you can control the future, you do not need to predict it.* Causal reasoning begins with a given goal or a particular effect to be created, and consists of principles, techniques, and criteria for generating and selecting between possible means to achieve the given goal or create the particular effect. Effectual reasoning begins with a given set of means and consists of a set of principles, techniques, and criteria based on the logic of control to generate and select between possible effects that can be created with those means.

Causation is extremely useful in domains where predictive rationality, pre-existent goals, and environmental selection are the primary factors that influence outcomes. But at least three eminent thinkers in the twentieth century have seriously questioned precisely these three assumptions about the decision domains in which most firms (particularly entrepreneurial ones) have to function and survive. Starting in 1921 with Knight, who raised the issue of a future that is not only unknown but is fundamentally unknowable, through March's garbage can model of decision making which suggests that goal ambiguity is a large part of organizational decisions (March, 1994), to Weick's exposition of decision makers who enact their environments (Weick, 1979), it is clear that a major alternative mode of reasoning is required to understand and solve problems outside the decision domain of causal rationality. Sarasvathy (2001) argues that such

an alternative to causal rationality is not some form of deviation from "rationality" or a type of "irrationality", but an *alternate category of rationality* based on effectual reasoning.

Precisely in domains where prediction is untenable, goals are ambiguous, and the decision makers themselves influence the environment, effectuation functions in a non-random fashion and allows decision makers to make *reasoned* and informed choices. Effectual reasoning, therefore, *integrates* the Knightian, Marchian, and Weickian problem spaces and techniques to provide a new, but theoretically fully funded alternative to causal reasoning.

A simple example should help clarify and distinguish between the two types of processes. Imagine a chef assigned the task of cooking dinner. There are two ways the task could be organized. The first case would be where the host or client has picked out a menu in advance. All the chef needs to do is to list the ingredients needed, shop for them and then actually cook the meal. This is a process of causation. It starts with a given menu and focuses on selecting between effective ways to prepare the meal. The second case would be when the host asks the chef to look through the cupboards in the kitchen for possible ingredients and utensils, and cook a meal. Here, the chef has to imagine possible menus based on the given ingredients and utensils, select one, and then prepare the meal. This is a process of effectuation. It starts with given ingredients and utensils, and focuses on preparing one of many possible desirable meals with them.

To extend the simple example to business, imagine the manufacture of a product. In the case of causal reasoning, estimates of market demand are provided in advance, together with possible product lines and their costs; the manufacturer needs simply to procure the raw materials and process and assemble them according to the predetermined plan. In the case of effectuation, the manufacturer has only a general idea that *might* lead to a product that *could* be marketed profitably. Gillette was looking for something that customers would have to purchase repeatedly (McKibben, 1998). While he was shaving one morning, it occurred to him that a non-permanent razor might fit his specification. He then had to develop a cheap, effective removable-blade razor, generate plans for creating an adequate initial market, search for sources of funds to get started, and so on, his goals continually changing as he gained new knowledge and pre-committed stakeholders from his initial efforts.

BACKGROUND AND HYPOTHESIS: THE THREE URNS OF FRANK KNIGHT

It was Frank Knight in 1921 who put the entrepreneur firmly on center stage in economics by showing that the existence of "profit" was inextricably related to the necessity to deal with uncertainty, particularly the type of uncertainty that could neither be diversified away, nor reduced over time through empirical experimentation and learning in pre-existent markets (Knight, 1921). He classified the knowledge (or ignorance) in our decisions involving the future under three types of uncertainty – usually referred to by Knightian scholars as (1) risk, (2) uncertainty, and (3) true Knightian uncertainty.

The commonly used statistical metaphor of the urn containing different colored balls serves to illustrate the difference between *risk* and *uncertainty* (Kamien, 1994). Problems involving risk are akin to a speculative game with an urn containing 5 green balls and 5 red balls. The drawer of a red ball is awarded a prize of $50. For any given draw, we can precisely calculate the

probability of getting a red ball, because we know the underlying distribution of balls inside the urn from which we are making the draw. Problems involving uncertainty involve the same award of $50 for the draw of a red ball -- except this time we do not know how many balls are in the urn, of which colors, or even if there are any red balls at all in the distribution. In statistical terminology, decisions involving the first type of urn with the known distribution call for classical analytical techniques; and the decisions involving the second type of urn with the unknown distribution call for estimation techniques. Once the underlying distribution is discovered through estimation procedures, the urn with the unknown distribution is transformed, as it were, into the urn with the known distribution and becomes susceptible to analytical techniques.

Experiments by researchers developing normative models have demonstrated that human beings in general prefer the "risky or known distribution" urn over the "uncertain or unknown distribution" urn (Ellsberg, 1961). But entrepreneurship researchers have speculated that since entrepreneurs have been shown to have a high tolerance for ambiguity, they would have a preference for the urn with the unknown distribution (Dickson & Giglierano, 1986; Kamien, 1994).

The theory of effectuation, however, deals with the third urn of *true Knightian uncertainty,* and suggests a rather different logic for the choice process than the two explicated above: "Whatever the initial distribution of balls in the urn, I will continue to acquire red balls and put them in the urn. I will look for other people who own red balls and induce them to become partners and put their balls in the urn. As time goes by, there will be so many red balls in the urn that almost every draw will obtain one. On the other hand, if I and my acquaintances have only green balls, we will put them in the urn, and when there are enough, will create a new game where green balls win." Of course, such a view may express hopes rather than realities, and many entrepreneurs in the real world do fail. This fact does not negate the hypothesis that they are often more concerned with molding, or even creating, the part of the world with which they are concerned than with predicting it and reacting to the prediction.

For the purposes of this study, the first approach is called – i.e., decision models dealing with the "known distribution" -- ANL (for analytical approaches). ANL includes traditional market research techniques such as focus groups and questionnaires and/or hiring professionals to study the market and come up with decision alternatives. The second – i.e., decision models dealing with the "unknown distribution" – is deemed BAN (for Bayesian approaches – "Bayesian" stands for all types of statistical estimation using iterative discovery procedures). BAN primarily includes test marketing, trial ballooning and other systematic techniques of experimentation and iterative learning aimed at discovering the structure and shape of the potential market.
At their logical core, both ANL and BAN are causation models. They require the decision maker to start with a pre-defined potential market and seek information about it using two different categories of approaches – analytical (ANL) and estimation (BAN). In contrast, effectuation, referred to as EFF for hypothesis testing, incorporates the logic of control, and involves attempts to shape and *create* the potential market rather than divine it through analytical or estimation techniques. EFF includes not only garbage can type heuristics, but explicit statements rejecting techniques of ANL and BAN, as well as awareness of the ability to shape the environment through pre-commitments from key stakeholders.

The central hypothesis for the first stage of data analysis can now be stated as:

> *When faced with creating a firm that markets a new product, expert entrepreneurs prefer effectuation (EFF) to the two types of traditional market research techniques involving analysis (ANL) and estimation (BAN).*

METHOD

The principal methodological logic for this study came from Ericsson & Simon (1993). This logic was implemented through procedures prescribed by the same source and supplemented by inductive qualitative analysis procedures from classic texts on qualitative research methods.

The study proceeded as follows: First, entrepreneurial expertise was operationalized as a set of criteria for sample selection. Second, a research instrument was developed to capture the information seeking tasks involved in discovering and/or creating the market for a new product. Third, the subjects completed the think aloud task and their concurrent verbal protocols were collected. Coding and analysis of the protocols proceeded in two stages. In the first stage, the hypothesis was tested and the existence of effectual reasoning established. In the second, a process model of effectuation contained in the protocols was inductively extracted.

Subjects

For the purposes of this study, an expert entrepreneur is defined as a person who, either as an individual or as part of a team, has founded a company, remained with the company for several years, and taken it public. The characteristics of the final subject pool suggest that the sample is fairly representative of the population of expert entrepreneurs. Subjects from 17 states across the US were all male, 90% American, aged between 40 and 82, with two thirds having graduate degrees. Besides founding a company, actively running it, and taking it public, the subjects have a variety of entrepreneurial experiences including multiple ventures, failures both before and after their successes, mergers and acquisitions, major PR coups and disasters, taking a public company private, etc. The companies they built and are currently involved in range in annual sales from $200 Million to $6.5 Billion as of March 1997. The companies also span a very wide range of industry groups, including retail goods and services, household products, teddy bears, ice cream, razors, security services, contract programming, computers, software, biotechnology, telecommunications, media, steel, railroads, power plants, and more.

The Research Instrument

Subjects were given a detailed description of an imaginary product called *Venturing*. Since the sample varied (intentionally) in all aspects except entrepreneurial expertise, the decision problem used in the study had to be chosen so as not to technologically or otherwise bias some subjects against others. Therefore entrepreneurship itself was made the product for which the subjects had to identify/create a market. *Venturing* is an imaginary game of entrepreneurship. Based on the description, subjects were asked to answer the following five questions:

1. Who could be your potential customers for this product?
2. Who could be your potential competitors for this product?

3. What information would you seek about potential customers and competitors -- list questions you would want answered.
4. How will you find out this information -- what kind of market research would you do?
5. What do you think are the growth possibilities for this company?

Protocols from Question 4, hereafter called the MR question, were used to test the central hypothesis. Thereafter, protocols from all the questions were analyzed to develop the grounded process of effectuation that the subjects used.

DATA ANALYSIS 1: TESTING THE HYPOTHESIS

First, the protocols from the MR question were read several times to identify relevant semantic chunks (N=235) for coding. The semantic chunk is the primary unit of analysis for hypothesis testing. A semantic chunk can range from a single phrase or sentence to a string of sentences that hang together to make a single meaningful point about the decision at hand. Second, the chunks were coded by the author and an external coder into three main categories ANL, BAN and EFF -- developed especially to test the hypothesis in the study. Inter-coder reliability was established through a Cohen's kappa of 0.90 significant at p < .01. A Chi-square test with Yates correction ($\chi^2 = 99.62$; p < .001) provided strong evidence for not rejecting the hypothesis. For additional rigor, a second test of the hypothesis was conducted using the method called Borda count from the social choice literature. In quantitative terms, the results showed that more than 63% of all the statements made by 74% of the subjects (20 out of 27) were statements of effectuation; 7 of the 27 did not make *any statements other than EFF*.

DATA ANALYSIS 2: DEVELOPING A PROCESS MODEL OF EFFECTUATION

Having discovered that except for 4 out of 27, the subjects did not use causal reasoning to any meaningful extent, the focus of the analysis shifted to the task of identifying the specific process model of effectuation that these 23 used instead. The contents of the protocols were analyzed using simple process tracing methods, such as those developed and used by researchers in cognitive science as a preliminary step to writing expert systems (Haines, 1974).

Exactly as suggested by the model of effectual reasoning, the subjects started their decision making process with a given set of means, rather than a pre-determined goal, to select their first customer (Stage i). Three categories of "means" emerged from the data. Subjects selected their first "customer" based on any one or a combination of the three categories: (1) Who they (the subjects) were; (2) What they knew; and (3) Whom they knew. Converting the initial customer into a strategic partner was the most popular method of developing a customer/segment definition (Stage ii).   The process for moving from this initial segment to the creation of a market consisted of two additional stages: (iii) Adding segments either through the development of additional products for the initial segment or through expanding strategic partnerships; and, (iv) Defining a market (at the *end* of the process) through a strategic vision for the company. In all, starting with exactly the same imaginary product, the 27 entrepreneurs ended up creating 18 different firms often in completely disparate markets/industries.

When put together as a process model, it became increasingly clear that the process emerging out of the data was an inversion of the causal reasoning that we teach students in entrepreneurship

classes. A decision maker who uses the textbook model would begin with *the* "market" – i.e., the universe of all possible customers for *Venturing*. This market would therefore be defined as all people who are computer literate and interested in either computer games or in learning about entrepreneurship or both. This pre-defined market would then be segmented based on variables such as age, spending power, previous purchases of computer games and/or entrepreneurship education, geographical location etc. Information would be gathered about each of these segments and some evaluation criteria would be developed based on size, growth potential, risk-return profile etc. One or more segments would then be selected as target segments with a view to maximizing potential return. Marketing strategies including distribution, pricing and promotion would be crafted and *Venturing* would be carefully positioned to capture the hearts and pockets of the individual customers in the target segment. *None of the subjects in this study, including the 4 who suggested using traditional market research techniques, actually used this top-down causal model for creating the market for Venturing.*

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