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7. Three Views of Entrepreneurial Opportunity

"Although we are not usually explicit about it, we really postulate that when a market could be created, it would be." – Kenneth Arrow (1974a)

For almost fifty years now, following the trail of issues raised by economists such as Hayek, Schumpeter, Kirzner and Arrow, researchers have studied the economics of technological change and the problem of allocation of resources for invention (invention being the production of information). The bulk of this literature simply assumes that new technical information will either be traded as a commodity or become embodied in products and services (hereafter called "economic goods"), without addressing any specific mechanisms or processes for the transformation of new information into new economic goods or new economic entities (such as new firms and new markets). It is inside this gap that we begin our quest for the concept of an "entrepreneurial opportunity".

In a recent interview with CNN, Whitfield Diffy, the inventor of public key encryption (currently an employee of Sun Microsystems), explained that although his entire subsequent career had benefited from his invention and he had done very well financially in the process, it did not occur to him to start a company to commercialize his invention. In fact he expressed astonishment at the "hundreds and hundreds of people trying to turn a buck on it". The designers of the MIR space station would no doubt express similar astonishment at the venture capitalists that recently bid (in vain) several million dollars to turn it into an advertising/tourist resort – just as the scientists working with DARPA did not foresee the age of e-commerce. The history of technological invention is full of unanticipated economic consequences. And, yet, the study of the economics of technological change is full of "just-so" stories[1] that

[1]*Just so stories* (based on Rudyard Kipling's (1909) collection of short stories of the same title) are stories that explain why things are the way they are. Such stories also tend to celebrate things the way they are – subscribing to the fallacy that because certain things came to be, there is some element of "optimality" or "correctness" attached to their origin and structure. This approach leads us to discount the significance of pre-histories because if existence by itself is the starting point of theory building, almost *any* story could ex-post serve as sufficient explanation for the pre-history. One delightful example is the story of an arbitrage struggle between an elephant and a crocodile that explains how the elephant came to have a long trunk! Relatedly, almost all the social sciences seem perfectly capable of explaining every creation after the fact, but can predict nothing before the creation.

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seemingly demonstrate the inevitability of commercialization of all new technologies through familiar recurring patterns such as the technology adoption curve. Unfortunately, of course, we do not have any data on all the new products and markets that were *not* created to commercialize new technologies in the past.

This paper challenges the assumption underlying current theories of technological change, laid out so pithily by Arrow in the initial quote, viz., "*when a market could be created, it would be*". Instead, it focuses on Arrow's exhortation to researchers to tackle one of the central problems in economics today: "*... the uncertainties about economics are rooted in our need for a better understanding of the economics of uncertainty; our lack of economic knowledge is, in good part, our difficulty in modeling the ignorance of the economic agent*." The central premise of this paper is that there exists an important area for research in the conceptual gap between a technological innovation and the markets that come into existence based on that innovation – a gap in our understanding of economics that is filled by the notion of "entrepreneurial opportunity." In this paper, we outline some initial steps in the study of entrepreneurial opportunity by summarizing how existing literature instructs us to proceed and then making a conjectural leap toward grappling with the complexities inherent in this phenomenon.

We begin our exposition with a definition of entrepreneurial opportunity. Then we delineate its elements and examine it within three views of the market process: I.e., the market as an allocative process; as a discovery process; and as a creative process (Buchanan and Vanberg, 1991). Within each stream, we examine the assumptions about the knowledge (ignorance) of the decision maker with regard to the future, and the implications of those assumptions for strategies to recognize, discover, and create entrepreneurial opportunities. We end the essay with a set of conjectures that challenge the inevitability of technology commercialization and argue for a more contingent approach to the study of the central phenomena of entrepreneurship.

Entrepreneurial Opportunity

The Oxford English Dictionary defines opportunity as "A time, juncture, or condition of things favorable to an end or purpose, or admitting of something being done or effected." If we believe that that ends are not always specified prior to the pursuit of an entrepreneurial opportunity, but may emerge endogenously over time, we can unpack the constituents of an entrepreneurial opportunity from the second part of the above sentence. An entrepreneurial opportunity, therefore, consists of a set of ideas, beliefs and actions that *enable* the creation of future goods and services in the absence of current markets for them (Venkataraman, 1997). For example, the entrepreneurial opportunity that led to the creation of Netscape involved (a) the idea of a user-friendly Web browser (Mosaic); (b) the belief that the internet could be commercialized; and, (c) the

set of decision-actions that brought together Marc Andreesen (the creator of Mosaic) and Jim Clark (the ex-founder of Silicon Graphics) to set up base in the small town of Mountain View.

In sum, our notion of an entrepreneurial opportunity consists of:

1. New idea/s or invention/s that may or may not lead to the achievement of one or more economic ends that become possible through those ideas or inventions;
2. Beliefs about things favorable to the achievement of possible valuable ends; and,
3. Actions that generate and implement those ends through specific (imagined) new economic artifacts (the artifacts may be goods such as products and services, and/or entities such as firms and markets, and/or institutions such as standards and norms).

Our ontological stance in defining an entrepreneurial opportunity in this manner transcends purely subjective and purely objective notions. An opportunity presupposes actors *for whom* it is *perceived* as an opportunity; at the same time, the opportunity has no meaning unless the actor/s actually act upon the real world within which the opportunity eventually has to take shape. As is made clear in the rest of the paper, this ontological stance enables us to take a pluralistic approach toward the phenomenon without falling into the mire of naïve relativism.

Three Views of Entrepreneurial Opportunity

Drawing upon three streams of economic literature pertinent to entrepreneurial opportunity – i.e., market as an allocative process, market as a discovery process, and market as a creative process – we could model an entrepreneurial opportunity as a function, or a process or a set of decisions, respectively. The antecedents for the three views presented here specifically draw upon three works, i.e., Hayek (1945), Knight (1921), and Buchanan and Vanberg (1991) – all of which grapple with the central problem demarcated by Arrow (quoted earlier) in terms of understanding uncertainties in the economy and modeling the ignorance of the economic agent.

In an important essay in 1945, Hayek postulated the concept of dispersed knowledge where no two individuals share the same knowledge or information about the economy. Hayek distinguished between two types of knowledge: First, the body of scientific knowledge, which is stable and can be best known by suitably chosen experts in their respective fields; second, the dispersed information of particular time and place, whose importance only the individual possessing it can judge. Hayek pinpointed the harnessing of this latter type of knowledge as a key and underestimated element in the economic development of society. This dispersion has two extremely important implications as far as entrepreneurial opportunities are concerned. First, dispersion of knowledge is

a root explanation for the presence of uncertainty, which gives rise to opportunities in the first place. Second, dispersion of knowledge is another root explanation of the nexus of the enterprising individual and the opportunity to discover, create and exploit new markets (Venkataraman, 1997; Shane, 2000). Without this nexus of the individual and the opportunity, most inventions will lie fallow. Frank Knight (1921) clearly realized the implications of uncertainty for economic organization.

In his seminal dissertation, *Risk, Uncertainty, and Profit*, Knight distinguished between three types of uncertainties about the future that an economic agent may face:

- The first consists of a future whose distribution exists and is known, and therefore decisions would only involve calculating the odds of a particular draw and placing one's bets based on the analysis. In this case, risks can be reduced through diversification. This assumes that all the possible outcome scenarios are all equally likely, *ex ante*.
- The second consists of a future whose distribution exists but is not known in advance. The agent, in this case, has to estimate the distribution through repeated trials and can then treat it the same as the first case. Furthermore, as the environment changes dynamically, successful strategies evolve through adaptive processes including careful experimentation and learning over time. Although we do not know the probabilities attached to each of the outcome scenarios, the probabilities do exist, and their distribution can be uncovered over time.
- The third type of uncertainty, which Knight called true uncertainty, consists of a future that is not only unknown, but also unknowable – with unclassifiable instances and a non-existent distribution. The economic agent, or entrepreneur, who takes on this true uncertainty, gets compensated for it through "profit" – a form of residual return after the normal factors of production are paid for and all market contracts fulfilled.

Knight did not explicate how the entrepreneur deals with this true uncertainty. But, instead he argued that:

> "The ultimate logic, or psychology, of these deliberations is obscure, a part of the scientifically unfathomable mystery of life and mind. We must simply fall back upon a 'capacity' in the intelligent animal to form more or less correct judgments about things, an intuitive sense of values. We are so built that what seems to us reasonable is likely to be confirmed by experience, or we could not live in the world at all."

In this third case of Knightian uncertainty, there is no meaning to the attachment of probabilities to the opportunity vectors. Instead, we need to understand the process through which the different levels of actors interact. The benefits get created endogenously, in the very unfolding of those interactions.

Later researchers, especially Austrian economists such as Von Mises (1949) and Kirzner (1997), and subjectivists such as Lachmann (1976) and Shackle

(1979), have tried to tackle this problem of Knightian uncertainty. Fixing a rather penetrating philosophical gaze on the works of these economic theorists since Hayek and Knight, Buchanan and Vanberg (1991) contrast the three views of economic theory presented here as follows: "*The market as an allocative process, responding to the structure of incentives that confront choice-makers; the market as a discovery process, utilizing localized information; or the market as a creative process that exploits man's imaginative potential* ..." They argue that "the perceptual vision of the market as a *creative process* offers more insight and understanding than the alternative visions that elicit interpretations of the market as a *discovery process*, or, more familiarly, as an *allocative process.* In either of the latter alternatives, there is a telos imposed by the scientist's own perception, a telos that is nonexistent in the first instance. And removal of the teleological inference from the way of looking at economic interaction carries with it significant implications for any diagnosis of the failure or success, diagnosis that is necessarily preliminary to any normative usage of scientific analysis."

But for the purposes of this paper, the key issue is not which of the three views is "*right*", but rather which view is more useful under what conditions of uncertainty. Such a pragmatic approach allows us to *utilize* the three views explicated so far to construct a rather simple typology of entrepreneurial opportunities based on the pre-conditions for their existence, as follows:

1. *Opportunity Recognition*
If both sources of supply and demand exist rather obviously, the opportunity for bringing them together has to be "recognized" and then the match-up between supply and demand has to be implemented either through as existing firm or a new firm. This notion of opportunity has to do with the exploitation of existing markets. Examples include arbitrage and franchises.

2. *Opportunity Discovery*
If only one side exists – i.e., demand exists, but supply does not, and vice versa – then, the non-existent side has to be "discovered" before the match-up can be implemented. This notion of opportunity has to do with the exploration of existing and latent markets. Examples include: Cures for diseases (Demand exists; supply has to be discovered); and applications for new technologies such as the PC (Supply exists, demand has to be discovered).

3. *Opportunity Creation*
If neither supply nor demand exist in an obvious manner, one or both have to be "created", and several *economic* inventions in marketing, financing etc. have to be made, for the opportunity to come into existence. This notion of opportunity has to do with the creation of new markets. Examples include Wedgewood Pottery, Edison's General Electric, U-Haul, AES Corporation, Netscape, Beanie Babies, and the MIR space resort.

Table 1 presents a summary comparison of the three views along several different dimensions. In the next three sections, we trace the implicit notions of entrepreneurial opportunity through each of the three literature streams on market process and develop key characteristics of the nature of entrepreneurial opportunities based on each of these perspectives.

Table 1. Comparing the three views of entrepreneurial opportunity

View	*Allocative View*	*Discovery View*	*Creative View*
What is an opportunity	Possibility of putting resources to good use to achieve given ends	Possibility of correcting errors in the system and creating new ways of achieving given ends	Possibility of creating new means as well as new ends
Focus	Focus on System	Focus on Process	Focus on Decisions
Method	Opportunities "recognized" through deductive processes	Opportunities "discovered" through inductive processes	Opportunities "created" through *abductive* processes
Domain of application	When both supply and demand are known	Only one or the other (supply or demand) known	When both supply and demand are unknown
Distribution of opportunity vectors	Opportunity vectors are equally likely	Existent, but unknown probability of opportunity vectors	Probabilities for opportunity vectors are completely non-existent
Assumptions about information	Complete information available at both aggregate and individual levels	Complete information at the aggregate level, but distributed imperfectly among individual agents	Only partial information even at the aggregate level, and ignorance is key to opportunity creation
Assumptions about expectations	Homogeneous expectations both at the micro and macro levels	Homogeneous expectations at the macro level; heterogeneous expectations at the micro level	Heterogeneous expectations at both micro and macro levels
Management of uncertainty	Uncertainty managed through: Diversification	Uncertainty managed through: Experimentation	Uncertainty managed through: Effectuation
Definition of success	Success is a statistical artifact	Success is outliving failures	Success is a mutually negotiated consensus among stakeholders
Unit of competition	Resources compete	Strategies compete	Values compete
Outcomes	Strategies for: Risk management	Strategies for: Failure management	Strategies for: Conflict management

The Allocative Process View

Neoclassical economic theory discusses several efficiency properties of markets – allocative, productive, coordinative, and informational. We will focus in this section on the allocative efficiency of markets and its implications for opportunity recognition. Allocative efficiency is achieved when: (a) the income of consumers is optimally allocated to consumption, i.e., they are able to buy the goods and services that they value most; and (b) resources (factors) are optimally allocated to production, i.e., they are used to produce the goods and services that consumers desire.

Allocative efficiency is achieved in a perfectly competitive market, whose characteristics are as follows: There is a very large number of buyers and sellers, all of whom are so small that none of them individually can affect prices; prices of homogeneous goods and factors are uniform throughout the economy; all factors are perfectly mobile; returns to scale are constant; and all economic agents have perfect knowledge about available alternatives. There is an assumption of complete markets, i.e., there are markets for all possible products and services. Furthermore, agents are free to enter and exit the market. Disequilibria are short-term phenomena, and are quickly cleared to bring the situation back to equilibrium through the tatonnement process – prices go up when demand exceeds supply and down when supply exceeds demand – which functions through the mythical figure of the Walrasian auctioneer. There are further requirements for the achievement of an optimal allocation of resources, such as the absence of any divergence between private and social costs and the existence of perfect competition in all sectors of the economy. When a market has achieved allocative efficiency, it complies with two conditions: First, price is equal to marginal cost, which is also equal to minimum average cost ($P = MC = \text{min}AC$); and second, Pareto optimality is achieved, which means that resources cannot be redistributed to make anyone better off without making someone else worse off.

The allocative view concerns itself with the optimal utilization of scarce resources. In this view, an opportunity is any possibility of putting resources to better use. At equilibrium, there are no opportunities, because resources have been optimally allocated. However, profits can arise in two ways. First, to the extent that a perfectly competitive market is not in equilibrium, opportunities for short term profits are available, but they quickly disappear when new firms enter the market attracted by the profits. Second, if we assume that all information is available in the system but is randomly distributed, and therefore acquiring information involves a costly search process, then the opportunity for profit is simply the difference between the benefit of the information and its cost. However, the random distribution of information means that no agent has the possibility of systematically benefiting from superior information. The core idea is that all products and ideas that can potentially exist are all known to be feasible but costly to produce. When the cost problem is solved (for example, due to scientific breakthroughs in laboratories), opportunities arise.

However, opportunity is not specific to any one person because there is no informational advantage within this view. Thus there is no heterogeneity between economic agents that enables one agent to be systematically better than another in acquiring information, and consequently in the recognition and pursuit of opportunities. Which agent recognizes the opportunity is therefore a purely random variable. Moreover, since there is no divergence between private cost and social cost (that is, the opportunity cost for an individual agent of a resource in a particular use is the same as the social opportunity cost of the resource in that use), any possibility of a Pareto improvement at the system level is equivalent to an opportunity at the individual agent level.

Arrow (1962) discussed three reasons why a perfectly competitive market could lead to a sub-optimal allocation of resources to invention: *inappropriability*, *indivisibility*, and *uncertainty*. In what follows, we analyze how allocative efficiency is compromised as a result of these three reasons.

Inappropriability

An issue that has been debated for many decades is whether there is any incentive to innovate in a perfectly competitive market, because it does not, by definition, permit the appropriation of rents in a sustained fashion. Kamien and Schwartz (1975) study the relationship between market structure and innovation, and conclude that "few, if any, economists maintain that perfect competition efficiently allocates resources for technical advance" (p. 2). Arrow (1962) argued that the incentive to innovate could exist even in perfectly competitive markets: "It may be useful to remark that an incentive to invent can exist even under perfect competition in the product markets though not, of course, in the 'market' for the information contained in the invention. This is especially clear in the case of a cost reducing invention. Provided only that suitable royalty payments can be demanded, an inventor can profit without disturbing the competitive nature of the industry. The situation for a new product invention is not very different; by charging a suitable royalty to a competitive industry, the inventor can receive a return equal to the monopoly profits" (p. 619).

For Arrow's point to be valid, the assumption of all sectors of the economy being in a perfectly competitive equilibrium must be relaxed. Schumpeter (1976) was of the opinion that the propensity of a firm to innovate was directly proportional to its size and market share. He based his view on the considerable resources required to innovate and the incentive of adequate return. Nutter (1956) disagreed – "Desire and necessity drive competitive and monopolistic producers alike to innovate: Desire for better-than-average profits motivates the venturesome and industrious to introduce new products and techniques; loss of profits forces the cautious and passive to imitate or perish" (p. 523).

Villard (1958) offered a view that ran counter to that of Nutter, concluding that innovation was unlikely at both extremes. "Industries where 'competitive oligopoly' prevails are likely to progress most rapidly and that therefore 'com-

petitive oligopoly' may well be the best way of organizing industry. The basic point is that progress is likely to be rapid (1) when firms are large enough or few enough to afford and benefit from research and (2) when they are under competitive pressure to innovate – utilize the results of research" (p. 491). Scherer (1967) agreed with Villard, arguing that moderate levels of concentration lead to the highest levels of innovation.

Indivisibility

Blaug (1985) defines indivisibility as follows: "If two productive agents are perfect substitutes of each other when used in combination to produce a given output, they are necessarily infinitely divisible: The isoquants in this case are straight lines, meaning that the marginal rate of substitution of the two factors is a constant" (p. 454).

Arrow (1962) argues that "a given piece of information is by definition an indivisible commodity, and the classical problems of allocation in the presence of indivisibilities appear here" (p. 615). He goes on to explain the problems: "In the absence of special legal protection, the owner cannot, however, simply sell information on the open market. Any one purchaser can destroy the monopoly, since he can reproduce the information at little or no cost. Thus the only effective monopoly would be the use of the information by the original possessor. This however, will not only be socially inefficient, but also may not be of much use to the owner of the information either, since he may not be able to exploit it as effectively as others" (p. 615).

Economic theory assumes that in the absence of property rights, the original creator or discoverer of particular information would lose control of it once it was reproduced and accessible to other parties. Thus a large part of the discussion on appropriate institutional structures revolves around establishing the right incentives – copyright laws, patent laws, etc. – for agents to innovate. However, there may be some classes of information that can be used only in combinations with other assets, such as human and physical capital. For this reason the rents from the use of such information may not accrue to parties who do not possess these assets, and this difficulty may provide adequate protection for the innovator, even in the absence of specific legal protection. There are many industries in which firms do not patent inventions in spite of the existence of patent laws. The distinction between information and knowledge becomes relevant here. Brown and Duguid (2000) argue that knowledge differs from information in three ways: First, knowledge is tied to a knower; second, it is harder to detach than information; and third, it is hard to give and receive because it requires more by way of assimilation. They also distinguish between the explicit and tacit dimensions of knowledge. "[S]trategy books don't make you into a good negotiator, any more than dictionaries make you into a speaker or expert systems make you into an expert. To become a negotiator requires not only knowledge of strategy, but skill, experience, judgment, and discretion. These allow you to understand not just how a

particular strategy is executed, but when to execute it. The two together make a negotiator, but the second comes only with practice" (Brown and Duguid, 2000: 133–134).

Thus, although information is indivisible and the costs of reproducing it are close to zero, we may relate it to a resource, as defined in the resource based view of the firm. Knowledge, on the other hand would be a capability in that it represents a combination of information, physical capital and human capital. Focusing exclusively on raw information makes us view opportunities as arbitrage possibilities, which are not agent specific. On the other hand, focusing on knowledge opens up rich vistas of agent specific opportunities, whose recognition depends upon already owned knowledge and other assets (Shane, 2000).

Uncertainty

Akerlof (1970) argued in his famous "lemons" paper that an extreme case of information asymmetry could lead to a complete market failure. Information asymmetry leads to uncertainty that causes a downward bias in demand and supply. This is because, at very high levels of uncertainty, agents will need concessions so large from the other party to the transaction that neither will recognize any opportunity in the exchange. Institutional support is then often needed to overcome the uncertainty and to restore trade in the market. For example, organizations such as the SEC ensure certain minimum levels of transparency and fair play, which benefit all participants in the form of an increase in the volume of trade. Markets themselves can correct for this asymmetry – firms specializing in information gathering, analysis, and dissemination pervade all markets. These firms lower an individual agent's search costs while increasing the quality of information. Institutions such as guarantees, brand names, and licensing practices are some of the other ways of overcoming the uncertainty caused by information asymmetry.

The other major reason for uncertainty according to Arrow (1974a) is the nonexistence, except in a very limited number of commodities, of futures goods markets:

> "Hence, the optimizer must replace the market commitment to buy or sell at given terms by expectations: Expectations of prices and expectations of quantities to be bought or sold. But he cannot know the future. Hence, unless he deludes himself, he must know that both sets of expectations may be wrong. In short, the absence of the market implies that the optimizer faces a world of uncertainty." (p. 6).

According to Arrow, this uncertainty leads to the economic agent taking steps to reduce risks, such as the holding of inventories, preference for flexible capital equipment, etc. It also leads to the creation of new markets for the shifting of risks, such as the equity market. However, while conceding that probabilities are subjective, because different agents have access to different information, he

implies that each agent can know his own distribution of probabilities from his own past. He states that uncertainty means:

> "[T]hat we do not have a complete description of the world which we fully believe to be true. Instead, we consider the world to be in one or another of a range of states. Each state of the world is a description that is complete for all relevant purposes. Our uncertainty consists in not knowing which state is the true one" (1974b).

The views of Frank Knight (and perhaps more importantly, the different interpretations of what he actually meant) on the distinction between risk and uncertainty become very relevant here.

In summary, there are several implications of viewing the market as an allocative process. First, the focus is on the system and not on individuals or firms, which are all homogeneous in their access to technology and in their cost structures. Second, *ex ante*, all economic agents are equally likely to detect a given opportunity. Opportunity recognition is thus a purely random process. Third, the term competition is as appropriately applied to factor markets as it is to the market for goods and services. In both cases, the markets are assumed to be in competitive equilibrium.

The Discovery Process View

Two factors influencing the distribution and use of new information have therefore attracted attention from researchers. The first is that access to information sources is extremely important, leading some researchers to suggest that the prime determinant of entrepreneurship is whether the entrepreneur has an advantageous network position from which informational advantages accrue (Burt, 1992). For instance, information is often "sticky" (von Hippel, 1994) in that it is tacitly accumulated by users, which means that access to the relevant information for discovery to occur is only available to a few individuals who have direct and intimate contact with users. Second, new information or knowledge often requires complimentary resources in order to be useful, such as a prior knowledge (Venkataraman, 1997; Shane, 2000) that is also often tacit in nature. Such prior knowledge creates the "absorptive capacity" necessary for an individual to make use of new information (Cohen and Levinthal, 1990).

The second reason why people possess different beliefs about the prices at which markets should clear is because, as Kirzner (1997) has observed, the process of discovery in a market setting requires the participants to guess each other's expectations about a wide variety of things. However, the regular supply of new information from endogenous sources creates uncertainty (Knight, 1921) owing to the fact that the discovery of genuinely novel information by other agents can affect the value of resources. Such discoveries cannot be known ahead of time and may add previously unimagined categories of usage for particular resources, thus changing the structure of the decision problem the

entrepreneur faces (Langlois, 1984). Since it is impossible to have accurate expectations about inventions that have yet to be made, people form expectations based on hunches, intuition, heuristics, and accurate and inaccurate information, leading their expectations to be incorrect some of the time.

The problem of forming accurate expectations given the genuine uncertainty caused by the endogenous supply of novel information is compounded by some characteristics of human decision-making. All individuals utilize knowledge that is subjectively held, incomplete and tacit. Entrepreneurs therefore form beliefs and expectations about future events that are indeterminate for at least three reasons. First, because much knowledge is tacit (Polanyi, 1967) other individuals – upon whose actions the correctness of the entrepreneur's expectations depend – often base their decision-making on invisible elements of experience that are hard to verbalize, but are observed instead only as hunches, intuition and judgement. Second, situations calling for prediction are not given self-evidently because the essence of any situation is how it is enacted by individuals (Weick, 1979). People often produce part of the situation they face (they "enact" it). The dependency of enactment on tacit cues imposed on a situation by individuals means that there is an indeterminacy in how individuals produce situations, just as there is an indeterminacy to how they react to them. This is especially so when multiple actors interact, making the production of a situation dependent on an "inter-enactment" process. The third reason why outcomes are indeterminate is because interaction among individuals gives rise to emergent outcomes. One example of an emergent outcome of the interaction of many individuals in a market is a structure of prices, but many other emergent outcomes are not so predictable, hence their discovery as an aspect of market processes. One of the traits of complex adaptive systems such as market processes is level differences: Observed patterns of behavior differ dramatically between the micro and macro levels. In other words, macro level phenomena are often indeterminate from micro-level observations. Hence the opportunity to discover is an outcome of the very inability to predict, or form accurate expectations, about such complex dynamic phenomena.

Since entrepreneurial opportunities depend on asymmetries of information and beliefs, entrepreneurs' buying and selling decisions are not always correct and this process leads to "errors" that create shortages, surpluses, and misallocated resources. An individual alert to the presence of an "error" may buy resources where prices are "too low", recombine them and sell the outputs where prices are "too high". The notion that individuals can make these genuine discoveries about misallocated resources has led some researchers to stress the role of "surprise" (Kirzner, 1997) in this process. The nature of overlooked profit opportunities is that they are *completely* overlooked, and therefore individuals are genuinely surprised when they identify a hitherto unexpected profit opportunity. Such surprises are not searched for at the cost of a deliberate search process. Instead, individuals are totally ignorant of these misallocated resources and their total ignorance precludes a deliberate search process. Given that uncertainty and indeterminacy make expectation formation difficult, it is

reasonable suggest that regular surprises will be a feature of the discovery process.

One factor that leads to stability in expectations is the role of institutions, which are routinized patterns of action. The presence of routines makes expectation formation a possibility, since certain patterns of human behavior can be reasonably predicted based on the observation of routines. Given the limitations pertaining on human cognition (Simon, 1997), routines are an essential aspect of human action for two reasons: First, because they allow each particular individual to preserve scarce decision-making resources for application to non-routine decisions; and second, because they allow all other individuals to economize on scarce decision-making resources because they can make reasonable predictions about the actions of others based on observation of their routines.

Routines are therefore pervasive at the individual level, where we usually describe them as habits, as well as at the organizational level. Every individual has a particular regime of unreflective habits that are accumulated over a lifetime of experience and experimentation (James, 1907). The particular habits of an individual amount to a specialized collection of routines. Organizations such as firms also accumulate specialized collections of routines (Nelson and Winter, 1982). In fact, one example of a predictable routine is the entrepreneurial process described here: People can reasonably forecast that some other people are conjecturing resources are undervalued in their current use and can be purchased and recombined and put to more valuable use. On the other hand, people can also reasonably forecast that many other individuals are simply carrying on with their daily lives: Being a fireman, or minding their children, or relaxing in their old age. In fact, were it not for the presence of imperfect information and a wide variety of routine modes of behavior (i.e. non-alert, non-entrepreneurs) the entrepreneurial discovery process would not work (Loasby, 1999).

Institutions are important because they impose structure on the world, and as we have already seen, an absence of structure creates the kind of uncertainty that makes forming accurate expectations an impossibility. But to the extent that institutions do exist, expectation formation is a reasonable possibility. Institutional routines therefore are an important part of the discovery process in two ways: First, because routines create a stable interpretative scheme, they enable the entrepreneur to impose order on and make sense out of the "bloomin' buzzin' confusion" of experience (James, 1907); and second, because individuals know what a stable structure is, they are able to notice exceptions. In essence, the notion of surprise only makes sense because an individual knows when he/she is *not* surprised. Since cognitive limits mean individuals cannot be attentive to everything at once, entrepreneurial alertness (Kirzner, 1997) is a function of what is *not* given attention; that is, it is a function of other routinized modes of behavior. In other words, entrepreneurial alertness is a scarce resource that comes with the opportunity cost of that which has been taken for granted.

Given that opportunity cost is the essential feature of resource use in choice, this economic calculation ought to come as no surprise to us.

Of course, as the structure of a particular market becomes well established and routinized, eventually entrepreneurial opportunities become cost inefficient to pursue. This occurs for two reasons. First, the opportunity to earn entrepreneurial profit will provide an incentive to many economic actors. As opportunities are exploited, an externality is created: Information diffuses to other members of society at no cost or low cost, and these individuals can imitate the innovator and appropriate some of the innovator's entrepreneurial profit. This diffusion through imitation is one of the most important yet underresearched aspects of the entrepreneurial process (Nelson and Winter, 1982). Although the entry of imitating entrepreneurs may initially validate the opportunity and increase overall demand, eventually competition begins to dominate (Hannan and Freeman, 1984). When the entry of additional entrepreneurs reaches a rate at which the costs from new entrants exceeds the benefits, the incentive for people to pursue the opportunity is reduced because the entrepreneurial profit becomes divided among more and more actors (Schumpeter, 1934).

The second reason entrepreneurial opportunities eventually become cost inefficient to pursue is that the exploitation of opportunity provides information to resource providers about the value of the resources that they possess, leading them to raise resource prices over time to capture some of the entrepreneur's profit for themselves (Kirzner, 1997). In short, the diffusion of information and learning about the accuracy of decisions over time, combined with the lure of profit, will reduce the incentive for people to pursue any given opportunity.

The duration of any given opportunity depends on a variety of factors. The duration is increased by the, "inability of others (due to various isolating mechanisms) to imitate, substitute, trade for or acquire the rare resources required to drive down the surplus" (Venkataraman, 1997: 133). For instance, the provision of monopoly rights, as occurs with patent protection or an exclusive contract, increases the duration. Similarly, the slowness of information diffusion, or lags in the timeliness with which others recognize information, also increase the duration, particularly if time provides reinforcing advantages, such as occur with the adoption of technical standards (network externalities) or learning curves.

What makes the discovery process metaphor powerful is that the dual premises of a continuous supply of new information and a continuous process of realizing information about the "errors" of prior expectations suggest the market process will be a continuous one. This view of the market as a process distinguishes the discovery view from the allocative view, where the metaphor of equilibrium leads to the perception of markets in static terms. In contrast, the discovery process illustrates how the market is necessarily "alive" and a hive of human activity.

The Creative Process View

The origins of the creative process view are more recent than the older views based on the market as a discovery process and the even older and established view of the market as an allocative process. Consequently, this view is not yet as well developed as the other two. The key idea in this view, as Buchanan and Vanberg (1991) point out, is that *telos* is neither ignored nor imposed on the phenomena concerned. Instead, ends emerge endogenously within a process of interactive human action (based on heterogeneous preferences and expectations) striving to imagine and create a better world.

The origins of the allocative process view lie in the philosophy of Adam Smith and the equilibrium-based calculus of Marshall (1920), Walras (1954), Arrow (1984) and Debreu (1991) and others; the development of the discovery process view owes its origins to the philosophical roots of evolution going back to Darwin (1859), and is steeped in the calculus of asymmetric information explicated by Hayek (1945), Nelson and Winter (1982) and others; similarly, the creative process view originates in the philosophy of pragmatism professed by James (1907) and Dewey (1917), and takes its cue for shedding a large portion of historical and even evolutionary determinism, instead moving toward a calculus of *contingency* based on the notion of human "free will."

In 1996, founding his arguments on the work of pragmatic philosophers, and drawing from reputed scholars in a variety of social sciences, Hans Joas (1996) sought to establish the creative nature of all human action. Key to his theorizing is a triad of arguments that demonstrate that action (as an empirical fact) is: (a) always situated (i.e., cannot presuppose purposes or be divorced from the sources of the actor's intentions); (b) intrinsically corporeal (i.e., cannot be freed from the constraints and possibilities of the body of the actor); and, (c) essentially social (i.e., cannot originate or occur meaningfully in the absence of others). The three sets of arguments challenge the existing conceptions of human action based on formal or normative models of based on "rationality" (for example, models of subjective expected utility). In Joas' own words, "… I have argued that some approaches towards a conceptualization of human creativity have actually drawn an artificial rift between creative action and the totality of human action. My intention is therefore to provide not a mere extension to, but instead a fundamental restructuring of the principles underlying mainstream action theory." (1996: 145)

Joas shows that to the extent that an actor is incapable of purposive action, lacks control over his own body, and is not autonomous vis-à-vis his fellow human beings and environment, his actions are creative. In other words, they end up creating novelties in our world. Hence, in Joas' conception, instead of being anomalies to be explained, surprise and novelty become natural desiderata of a theory of human action that is not confined to so-called "rational" action.

The creative process view urged by Buchanan and Vanberg (1991), although developed independently of Joas' work, asks us essentially to speculate on an

alternative model of human action, and to develop non-teleological theories of economics. In other words, if human beings are not assumed to be "rational" actors, but instead if human behavior is deemed inherently creative, what kind of an economics (or any other social science, for that matter) would we get?

Joas (1996) and Buchanan and Vanberg (1991) are not isolated in their exhortation to scholars to pursue this line of inquiry. March's garbage can model of decision making contains one such set of attempts (March, 1994). In his own words, "In a garbage can process, it is assumed that there are exogenous, time-dependent arrivals of choice opportunities, problems, solutions, and decision makers. Problems and solutions are attached to choices, and thus to each other, not because of any means-ends linkage but because of their temporal proximity" (1994: 200). Examples of garbage cans include committee and board meetings where a variety of problems, solutions, and decision makers come into temporal proximity with or without particular means-ends chains being involved in the coming into being of particular choices. Building further upon such attempts, March urges us to build a "technology of foolishness" or theories of decision making in the absence of pre-existent goals (March, 1982).

Other attempts in this direction include the empirical work based on Weick's theories of enactment and sensemaking (Weick, 1979). Just as March's oeuvre on decision-making highlights the endogeneity of goals, Weick in his theory of enactment focuses on the endogeneity of the environment. He points out how theorizing about "organization" and "environment" as two separate entities prevents organizational scholars from asking important questions. In his own words, "But the firm partitioning of the world into the environment and the organization excludes the possibility that people *invent* rather than discover part of what they think they see." (1979: 166)

As early as 1969, Simon (1996) had talked about designing or planning without final goals and the *artificial* nature of the world we live in. His exposition brought out the role of current action in the design of future environments. In his own words, "The real result of our actions is to establish initial conditions for the next succeeding stage of action. What we call 'final' goals are in fact criteria for choosing the initial conditions that we will leave to our successors." Therefore, how we want to leave the world for the next generation becomes an important question in theories based on the creative view.

In sum, the crux of the creative process view is the need to build non-teleological theories of human action, wherein values and meaning emerge endogenously. Recent empirical work in expert entrepreneurial decision-making (Sarasvathy, 2001b) has led to the development of such a non-teleological theory in entrepreneurship. This theory posits an alternative to predictive (causal) rationality, called effectuation, that underlies decisions made by entrepreneurs in bringing new firms and markets into existence (Sarasvathy, 2001a). Starting without any given goals, effectuation inverts the key principles and logic of predictive rationality to carve out an alternative paradigm to rational choice. In this view opportunities do not pre-exist – either to be recognized or

to be discovered. Instead they get created as the residual of a process that involves intense dynamic interaction and negotiation between stakeholders seeking to operationalize their (often vague and unformed) aspirations and values into concrete products, services and institutions that constitute the economy.

Integrating the Three Views

In the foregoing exposition we have outlined and briefly discussed three views of entrepreneurial opportunity under the broader umbrella of the three views of the market process as allocative, discovery, and creative. We now turn to the question of how to integrate the three views into our practice and pedagogy and future scholarship, particularly in the area of entrepreneurship.

One way to look at the three views would be to simply consider them three equally valid and non-overlapping modes of thinking about entrepreneurial opportunities. Such an approach focuses only on the distinctions between the views and overlooks both the possibilities of relationships and interactions between them, and also the fact of empirical confounding in the way they are embodied in economic phenomena. Table 1 sets out all three views along certain key dimensions and allows us to discuss from a bird's eye view, as it were, both distinctions and overlaps.

For example, looking at the operationalization of the three views as the recognition, discovery, and creation of opportunities suggests that the creative view might be more general than and prior to the other two views. This is because creative processes contain recognition and discovery as necessary inputs, while recognition and discovery can do without most key aspects of creativity. A simple example of this point is that before we can "recognize" or "discover" great art, that art has to have been created. Similarly, entrepreneurial opportunities may be posited to have been "created" through the decisions and actions (conscious or unintended) of economic actors before someone can "recognize" or "discover" them. For instance, once specific goals, values and preferences have been formed through the creative process, discovery processes can discover various means to achieve the goals. And when both ends and means become manifest, allocative processes figure out which particular means can best achieve which particular ends.

We could argue the case of Starbucks as an illustration. The original founders (before Howard Schultz came into the picture) acted effectually to create a shop selling fresh roasted beans in Seattle, mostly because one of the founders happened to love coffee from fresh ground beans. It did not even strike them to brew coffee and allow customers to taste it, let alone a vision of the Starbucks coffee bar market as it exists today. After customers actually asked to taste the coffee, the firm turned into a coffee shop that then allowed Schultz to "discover" the potential market for coffee bars and franchise the idea nationally. Today, almost anyone with the basic resource requirements can open up a Starbucks

franchise. In this particular case, we can see how each of the three views of entrepreneurial opportunity is empirically valid at different stages of market creation.

Another way to integrate the three views would be to recognize that they are extremely context-dependent. In other words, each view is useful under different circumstances, problem spaces and decision parameters. For example, when resources are clearly specified and goals are given, the allocative view will be the most appropriate. In contrast, when the problem spaces are characterized by enormous uncertainties, and value criteria for making choices are highly ambiguous, a creative approach might be called for.

The essence of our exposition is not to establish the superiority of any one of the three views or even to completely characterize them in all their possible relationships. Rather, our explicit intention here is to demonstrate that the study of entrepreneurial opportunity is a far richer and substantially more textured and interesting area of inquiry than it has hitherto been supposed to be. Furthermore, it derives its interest and promise as much from the practitioner's desire to earn higher profits as from the philosopher's and artist's dreams of creating a better world. But perhaps *most importantly*, an inquiry into entrepreneurial opportunity has the potential to unlock one of the greatest intellectual puzzles of our time, namely the creation of new value in society.

Summary and Conclusions

In conclusion, every invention[2] engenders opportunities for the creation of several possible economic (as well as other types of socially significant) effects. In the foregoing sections we have examined three sets of views with regard to how these effects come to be. Approaches based on the view of the market as an allocative process focus entirely on the final effects of opportunity creation, treating the processes leading to these final effects as mere detail; approaches based on the view of the market as a discovery process emphasize only the origins of the opportunity for creation, treating the final effects as inevitable products of competitive markets; and finally, approaches based on the view of the market as a creative process emphasize the decisions and actions of the agents, making both origins and final effects contingent upon those decisions and actions.

In our view, if we are to deepen our understanding of entrepreneurial opportunity, we need to integrate these three approaches, emphasize contingencies rather than inevitabilities in each. As a first step in that direction, we offer the following fundamental argument for the study of the central phenomena of entrepreneurship – viz., entrepreneurial opportunities.

[2]The term "invention" need not be limited to technological (i.e., science-based) inventions. Inventions can occur in all spheres of human activity – in the arts (surrealism), in sports (snowboarding) and in philosophy (pragmatism), to name only a few.

Conjecture 1:

The set of all possible economic goods based on any invention is larger than the set of economic goods actually created within a finite period of time after the invention.

Conjecture 2:

Not all actual economic goods created from an invention will be created by existing economic entities. In other words, the creation of new economic goods often entails the creation of new economic entities such as new firms and new markets.

Conjecture 3:

From the point of view of economic welfare, not all actual economic goods and economic entities arising out of any invention are equally "desirable".

Ergo, the lags (temporal and otherwise) between any invention and the creation of new economic welfare enabled by it, require not only the ability and alertness to recognize, and the perception and perseverance to discover opportunities for the achievement of pre-determined goals such as increasing profits and larger market shares, but also necessitate decisions and actions based often only on human imagination and human aspirations, that may or may not in time lead to new products, firms and markets.

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