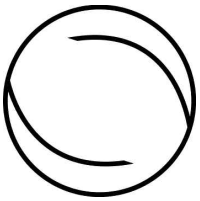


Serendipity in Entrepreneurship

Nicholas Dew

Abstract

This paper addresses the concept of serendipity in entrepreneurship, defined as search leading to unintended discovery. It conceptually delineates serendipity, showing how it is related to the entrepreneurship literature on prior knowledge and systematic search. The paper also discusses how serendipitous entrepreneurship relates to some aspects of evolutionary theory, socio-economic institutions, and social psychology. It is suggested that serendipity may be a quite prevalent feature of entrepreneurship and thus has implications for both research and practice.

Keywords: serendipity, entrepreneurship, opportunity

Nicholas Dew
Naval Postgraduate School, Monterey, USA

Introduction

'Entrepreneurship is a series of random collisions. Sure, you start with a plan and follow it systematically. But even though you start out in the alternative energy business, you are just as likely to end up in real estate development.' (David A. Padwa, founder of Agrigenetics Corp., quoted by Silver 1985: 16)

Despite their significance, the serendipity of many events goes unrecognized (and even denied) for long periods of time. Columbus, for instance, discovered America's shores while searching for a passage to India. Yet, all his life he refused to recognize that the land he had found was not the land he had set out to explore for; one unlikely consequence of this is that we still refer to native Americans as 'Indians'.

Columbus' discovery of the 'New World' was, of course, an example of serendipity: of making a discovery, by accident and sagacity, of things not in quest of.

Picasso's Blue period is another well-known example of serendipity — a confluence of situational factors that gave birth to a new genre of art that, though marvelous, was quite unintended. So the story goes, Picasso had only blue paint to work with one day, but when he started to toy with the effects of painting with this one color, he found that interesting art could be made of it. Thus, Picasso took what was initially a serendipitous constraint, and leveraged it into a creative result.

In what follows, I want to suggest that serendipity also plays an important role in entrepreneurship. For the purposes of this paper, I define serendipity as search leading to unintended discovery. Many entrepreneurship scholars, as well as many entrepreneurs, intuitively conceptualize entrepreneurial opportunity in terms of

Organization Studies
30(07): 735–753
ISSN 0170–8406

DOI: 10.1177/0170840609104815

serendipity — some combination of search (directed effort), contingency (favorable accidents), and prior knowledge (sagacity).[1] Entrepreneurship scholars have identified roles for both systematic exploration and spontaneous recognition in the literature on the discovery of opportunities (Fiet 2002; Shane 2000). Serendipity lies between these two concepts: individuals are involved in some kind of search effort when they accidentally discover something that they were not looking for. In this paper, I suggest that there are good theoretical reasons for supposing that serendipity has a logical place in a taxonomy of opportunity discovery, based on a framework that shows how the concepts of systematic exploration, spontaneous recognition, and serendipity have related conceptual underpinnings. My suggestion is that a theory of entrepreneurship is therefore likely to be incomplete without the concept of serendipity and that, once a non-trivial place has been located for serendipity in entrepreneurial behavior, several implications follow for research and practice.

The paper deals with these points as follows. The next section describes the concept of serendipity and offers a framework that integrates serendipity within the entrepreneurship literature. The following section discusses how serendipitous entrepreneurship relates to some aspects of evolutionary theory, socio-economic institutions, and social psychology. A subsequent section deals with implications for research and practice. Brief concluding remarks follow.

The Concept of Serendipity

Serendipity is an ambiguous word. It combines the notions of (fortunate) 'accident' with 'sagacity', which means acute mental discernment and a keen practical sense. Modern Webster's dictionaries define serendipity as 'an aptitude for making desirable discoveries by accident', but this definition arguably just follows a modern trend which highlights the sagacity in serendipity and demotes the equally important components of search and good fortune in the term (Merton and Barber 2004).

A well-known and excellent example of serendipity in scientific discovery — Fleming's discovery of penicillin in 1928 — helps illustrate the meaning of the term. Despite the fact that other researchers had noted the antibacterial effects of penicillin, it was Fleming who is widely credited with its discovery. First, Fleming was actively searching for a discovery when he found penicillin. Second, the fortunate accident was that Fleming was cleaning up his laboratory when he noticed how penicillin mold had contaminated one of his old experiments — a completely unanticipated contingency. Third, sagacity enters the story because Fleming had been experimenting with the antibacterial properties of common substances for many years, and therefore had enough prior knowledge about molds to find that particular petri dish anomalous, and immediately begin to discern its potential implications.

The vast majority of research on serendipity involves scientific discoveries such as Fleming's. Both Merton and Barber (2004) and Roberts (1989) provide a compendium of serendipitous discoveries in science. In addition, there are a very large number of discussions of the nature of serendipity in a wide variety of papers on scientific discovery (Van Andei 1994). Between 1950 and 2003 there were at least

832 publications across all branches of science with 'serendipity' or 'serendipitous' in their title (University of Pennsylvania 2004). In fact, the regularity with which serendipitous discoveries are made in science has led some historians to describe serendipity as a significant factor in the evolution of science (Kantorovich and Neeman 1989). Over the years, a great many scientists have also directly expressed their views about the importance of serendipity in scientific work, perhaps none more colorfully than the 19th-century French physiologist Bernard:

'Experimental ideas are often born by chance, with the help of some casual observation. Nothing is more common: and this is really the simplest way of beginning a piece of scientific work. We take a walk, so to speak, in the realm of science, and we pursue what happens to present itself to our eyes. Bacon compares scientific investigation with hunting: the observations that present themselves are the game. Keeping the game simile, we may add that, if the game presents itself when we are looking for it, it may also present itself when we are not looking for it, or when we are looking for game of another kind.' (Bernard 1865, quoted in Van Andei 1994: 635)

As well as the idea of serendipity, there is also the idea of pseudo serendipity, which refers to a situation in which someone is looking for something in particular, but the route by which they discover it is accidental and unanticipated. For instance, Charles Goodyear made many attempts to stabilize natural rubber so that it could be made useful, but it was only when he accidentally allowed a mixture of rubber and sulfur to touch a hot stove that he discovered *vulcanization* (Roberts 1989: 54). Similarly, Alfred Nobel had experimented extensively with ways of taming nitroglycerin, but it was an accidentally cut finger that prompted him to experiment with a mixture of collodion (commonly applied to wounds in Nobel's day) and nitroglycerin, a combination that was later patented as blasting gelatin, and is still used to this day.

There are diverse examples of serendipity in entrepreneurship. The founding of Staples office supply retail chain provides one example of the serendipitous discovery of an underserved market (Sarasvathy 2007). On the Thursday before the Fourth of July weekend in 1985, Thomas Stemberg, who had recently lost his job as division manager for a supermarket chain, was working on a business plan for starting a new chain, when he ran out of the printer ribbon for his Apple Imagewriter. When he went out to purchase a new ribbon, he simply could not get it. Either stationery stores had closed early for the weekend, or the ones that were open did not carry the ribbon. 'It dawned on me', he said in an interview with CNN's Stuart Varney, 'that not only could small entrepreneurs not get stationery at the rate of bigger companies, sometimes they couldn't get it at all.' He still had no ribbon to finish his business plan over the weekend, but he had found the new venture he actually wanted to start in that contingency.

Honda's discovery of a market for small motorcycles in the USA has also been cited in the literature as an example of serendipity (Denrell et al. 2003; Van Andei 1994). In the late 1950s Honda sought to introduce large motorcycles into the US market in competition with Harley Davidson and European importers. Its strategy was based on its analysis of the US market, where big bikes were very popular. However, members of Honda's import staff used small 50cc bikes for their own transport needs. According to Kihachiro Kawashima, Honda's US president:

'We used the 50s ourselves to ride around Los Angeles. They attracted a lot of attention. One day we had a call from a Sears buyer … surprisingly, the retailers who wanted to sell them weren't motorcycle dealers, they were sporting goods stores.' (Pascale 1984: 55)

Thus Honda serendipitously discovered a latent market for small motorcycles in the USA, in a classic example of searching for one opportunity and discovering another through a contingent interaction — in this case, with a Sears buyer — what Mintzberg (1996) has described as being 'pleasantly surprised' by a contingency.

Serendipity also sometimes occurs in the discovery of new combinations of factors of production (Schumpeter 1934). An example of this can be found in the history of J. R. Simplot, the potato magnate. Simplot built a business storing and sorting potatoes and onions during the Great Depression. Silver (1985) recounts that:

'in the spring of 1940, Jack Simplot decided to drive to Berkeley, California, to find out why an onion exporter there had run up a bill of $8,400 for cull (or reject) onions without paying. … The girl in the office said the boss wasn't in. Fine, said J. R., he would wait until the man arrived.

'Two hours later, at ten o'clock, a bearded old man walked in. Assuming this was his debtor, Simplot accosted him. But he turned out to be a man named Sokol, inquiring why he was not getting his due deliveries of onion flakes and powder. They sat together until noon, but still the exporter failed to arrive.

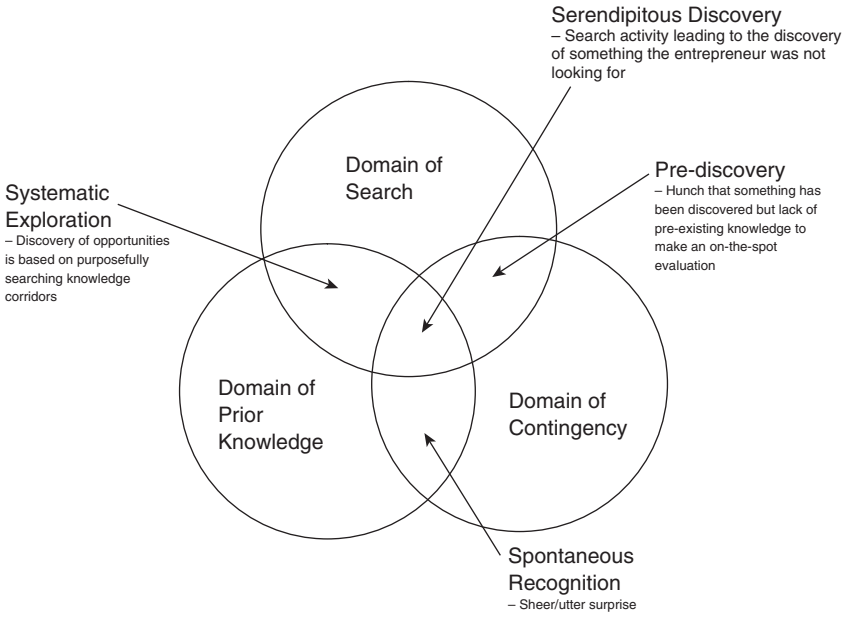
'As the noon hour passed, Simplot was suddenly struck with an idea. He asked the bewhiskered old trader to a fateful lunch at the Berkeley Hotel. "You want onion powder and flakes," said J. R., "I've got onions. I'll dry 'em and make powder and flakes in Idaho."'

Thus, through a contingent meeting with Sokol, Simplot found an opportunity to recombine his existing resources (storage and sorting facilities and access to a large supply of onions) with new ones (onion-drying processes). This recombination was important because drying onions (and later potatoes and other foods) increased the capital efficiency of Simplot's traditional operations by reducing the warehouse space required for storage by a factor of seven. Simplot thus discovered synergies with his existing operations, an example of the serendipitous discovery of strategic interactions between resources, described by Denrell et al. (2003).

Table 1. Examples of Domains and Overlaps in Figure 1

Domains and overlaps	Examples
Contingency/accident	J. R. Simplot's chance meeting with Sokol (Silver 1985); Peter Hodgson's chance attendance of a party where kids happened to be playing with Silly Putty as a toy (Van Andei 1994).
Prior knowledge	Knowledge of technologies, markets, and customer needs learned from working with users in their prior jobs. Bhidé (1996) found that over 50% of HBS entrepreneurs he sampled started their firms based on specific insights gained in prior employment.
Search activity	Thomas Edison searched 6000 vegetable growths and 'ransacked the world' for a suitable filament for his most important innovation: the electric light bulb (Weitzman 1998).
Systematic exploration	An entrepreneur's periodic scrutiny of their storehouse of previously shelved venture ideas; for firms, periodic scrutiny of previously shelved technologies, patents, etc. (Wilson and Hlavacek 1984).
Spontaneous recognition	Opportunities for commercializing. MIT's 3DP technology was spontaneously recognized by eight different entrepreneurs (Shane 2000).
Pre-discovery	Corning's pre-discovery of technology for optical fibers (Cattani 2006).
Serendipity	Thomas Stemberg's founding of Staples office supply retail chain (Sarasvathy 2007).

Figure 1.
Domains of
Opportunity Discovery



Since serendipity is a somewhat elusive concept, I will examine a framework that helps to tangibly locate it in relation to prior research in the entrepreneurship literature on opportunity identification, discovery, and creation (Shane and Venkataraman 2000). The focus is on three conceptual building blocks that have been extensively explored in the literature. In essence, serendipity involves the interaction of three elements: a resource (sagacity), an event (contingencies), and an activity (the individual is already on a journey). Figure 1 uses a framework that captures these three elements as three domains and relates them to different types of opportunity discovery.[2] Table 1 illustrates this framework with examples from a variety of entrepreneurial endeavors.

The three domains in Figure 1 can be described as follows. First, within the entrepreneurship literature the concept of prior knowledge captures the notion of sagacity, i.e. the prepared mind. Prior knowledge is a stock of information known to a particular individual. Because information is generated through idiosyncratic life experiences, the stock of prior knowledge held by individuals differs considerably (Venkataraman 1997). Empirical research has shown that prior knowledge is influential in the discovery of entrepreneurial opportunities (Shane 2000).

The second domain is that of contingencies. Contingencies can be defined as events that are not logically necessary, i.e. could not have occurred. They may happen by pure chance, or without a known cause. In the model presented in Figure 1, contingencies represent the influence of the exogenous environment on the discovery of possible opportunities. Anecdotal evidence suggests contingent events abound in entrepreneurship, and several papers in the literature ascribe an important role to contingencies (Mintzberg and Waters 1982; Sarasvathy 2001).

The third domain is search. Search activity involves purposeful actions undertaken to acquire new information. Because search is costly, it has been theorized that differences in search costs may explain the propensity of some individuals to become entrepreneurs rather than others (Stigler 1961). Prior research

has suggested that heterogeneous search capabilities may be one kind of individual-specific entrepreneurial resource (Alverez and Busenitz 2001). Importantly, search activity may occur with or without invoking prior knowledge. Because individuals forget things, they may even sometimes search for the same things more than once (De Holan and Phillips 2004). Some possible examples of search without prior knowledge include random search processes (Hayes 2001), habitual search activity (Hodgson 2006), and playful search (March 1982).

The overlapping areas of the three domains of search, prior knowledge, and contingency results in four fictional opportunity discovery 'spaces' in Figure 1: a space where opportunities are discovered as the result of the systematic exploration of knowledge corridors; a space where opportunities are discovered as a result of spontaneous recognition; a space where search and contingency result in pre-discoveries; and finally, a space where serendipities occur. The next sections of the paper describe each of these in turn.

Systematic Exploration

Several authors have suggested that the discovery of entrepreneurial opportunities might be the result of purposeful search activity (Caplan 1999; Fiet 1996, 2002). This search may involve looking for demand-side opportunities arising from unserved or underserved market needs, or it may involve looking for supply-side opportunities arising from the possibility of serving market needs with new resource combinations. The former is sometimes conceptualized as search of an exogenously given opportunity set, whereas the latter may be conceptualized as an endogenous process (Weitzman 1998: 332).

In either case, two characteristics of the notional search space are important. First, the number of possibilities that have to be searched is vast, which means searching for opportunities is costly. Therefore the effectiveness of search depends on entrepreneurs making cost-effective informational investments that equilibrate the costs of search with the benefits it may potentially produce (Fiet 1996; Stigler 1961). Second, public areas of the search space are unlikely to be especially fruitful because other entrepreneurs are likely to have already searched there and thus picked all of the 'low-hanging fruit'. Therefore the entrepreneur may be better off searching areas where information asymmetries exist, i.e. where it is possible that the entrepreneur may gain a competitive advantage because of private information (Hayek 1945). This suggests that the entrepreneur should constrain their search to a 'consideration set' that initially consists of their prior knowledge resources (Fiet 2002). This overlap between the domain of search and the domain of prior knowledge is captured in Figure 1 as the space where opportunity discovery is the result of systematic exploration of knowledge corridors.

The effectiveness of systematic exploration is a function of relative search costs and the nature of prior knowledge. Heterogeneous search costs may explain why some people discover opportunities while others do not. One explanation of different costs is that individuals mostly search myopically, which suggests that opportunity discovery is situational, because individuals are more likely to discover opportunities that are 'cheap' to find because they happen to be nearby, i.e. close to their pre-existing knowledge. An alternative explanation is that entrepreneurs have better search processes than non-entrepreneurs, either because they

scan information better or have superior information-processing abilities, maybe as a result of acquired expertise (Shaver and Scott 1991). Alverez and Busenitz (2001:755) build on this explanation by suggesting that the prior knowledge and cognitive ability of entrepreneurs may be conceptualized as a heterogeneous resource, arguing that entrepreneurs 'have individual-specific resources that facilitate the recognition of new opportunities and the assembling of resources'. They argue that these resources give entrepreneurs a relative advantage (over non-entrepreneurs) in systematically exploring for opportunities.

Spontaneous Recognition

An alternative and complementary category of entrepreneurial opportunities are those that involve spontaneous recognition. Obvious opportunities can be searched for, but entrepreneurs cannot search for information that they do not know exists (Kirzner 1997). In these cases, individuals are (initially) utterly ignorant of the existence of the possible opportunity. However, they may recognize an opportunity if they happen to come across it contingently. Thus, some opportunities may be discovered in the absence of any search activity. Figure 1 captures this space of opportunities as the space where the domains of contingency and prior knowledge overlap.

A good example that fits into this space is Shane's study of eight entrepreneurs who sought to commercialize a new technology, called 3DP, that was developed at MIT (Shane 2000:451). Shane points out that the discovery of opportunity was based on the contingent arrival of new information: 'People do not discover opportunities through search, but through recognition of the value of new information that they happen to receive through other means.' In the case of Shane's study, all eight entrepreneurs he studied heard about 3DP technology from someone directly involved in its development. None of the entrepreneurs had contacted MIT's Technology Licensing Office about the technology. Therefore, in these cases the discovery of opportunity occurred because of a combination of two elements captured in Figure 1. First, new information arrived contingently, i.e. the entrepreneurs were all introduced to 3DP technology by social network contacts. Second, they combined this new information with their prior knowledge of a possible use or application of the technology. The result of this matching process was the discovery of a possible opportunity. According to Shane, none of the eight entrepreneurs said they found the commercial opportunity by searching for it. Instead, they each discovered different opportunities to apply the new technology based on their prior knowledge.

The results of Shane's study are very much in line with arguments made in the literature about knowledge 'corridors' (Ronstadt 1988; Venkataraman 1997). Prior knowledge captures the idea of a stock of knowledge, and the knowledge corridor metaphor adds the hypothesis that this accumulation process typically occurs along a narrow, probably path-dependent trajectory. Studies of habitual entrepreneurs have added the insight that much of the specific knowledge accumulated by entrepreneurs occurs in the course of their prior entrepreneurial experiences (Ucbasaran et al. 2008). Prior experience therefore generates specific knowledge that is used in recognizing future opportunities, and thus may potentially fuel future episodes of entrepreneurship in an individual's career. Very experienced entrepreneurs may be adept at recognizing several different opportunities in a given invention such as the one described by Shane (Gaglio and Katz 2001).

Pre-discovery

Figure 1 also reveals one space of opportunity discovery that has been less studied in the literature. This is the space where contingency and search overlap, but without prior knowledge (sagacity). In this space, unanticipated opportunities are 'pre-discovered', i.e. an entrepreneur may suspect that they have discovered an opportunity but they lack the pre-existing knowledge that is needed in order to immediately recognize what has been discovered. For example, penicillin had been 'pre-discovered' by many bacteriologists who had observed the growth of one bacterium inhibiting the growth of another. However, these individuals lacked the prior knowledge that was needed in order to make an on-the-spot evaluation of what they had found (Merton and Barber 2004: 176).

In the literature on technology evolution, recent empirical research by Cattani (2006) highlights that pre-discoveries are quite commonplace. Cattani uses the term 'pre-adaptation' to describe some technology discoveries firms make: 'that part of a firm's technological knowledge base that is accumulated without anticipation of subsequent uses (foresight), but might later prove to be functionally "pre-adapted" (i.e., valuable) for alternative, as yet unknown, applications' (Cattani 2006: 286). One firm Cattani studied was Corning, where the technologies for optical fibers and flat-panel display glass were both pre-discovered years before the complementary knowledge necessary to commercialize them was developed. As emphasized by Garud and Nayyar (1994) in their framework, such discoveries may be systematically explored for their knowledge characteristics, and relevant knowledge about them may be stored for potential reactivation, synthesis, and use in the future.[3]

Serendipity

While systematic exploration, spontaneous recognition, and pre-discovery highlight different combinations of search, prior knowledge, and contingency, serendipity captures all three in a single combinational concept (see Figure 1). Serendipity is distinct from exploration and recognition (two ideas debated vigorously in the literature — Alsos and Kaikkonen 2004; Gaglio & Katz 2001), yet builds on elements common to both these concepts. It differs from systematic exploration because it incorporates a significant role for contingent environmental factors in the discovery of opportunities. It differs from spontaneous recognition because it supposes that opportunity discovery involves a vigorous quest on the part of the entrepreneur, rather than the discovery of opportunities that were all along under the entrepreneur's nose (Kirzner 1997: 72). It differs from pre-discovery in that it incorporates a role for prior knowledge in the opportunity discovery process.

This combinational conception of serendipity is also useful in distinguishing serendipity from luck (Barney 1997; Demsetz 1983; Friedel 2001; Ma 2002). Luck is captured in the domain of contingency (Figure 1). As described by Denrell et al. (2003: 989):

> 'While good luck may befall the inert or lazy, serendipitous discovery occurs only in the course of an energetic quest — a quest in which lucky discoveries of an unanticipated kind can be recognized through alertness and then flexibly exploited.'

For the purposes of this paper, I shall define pure luck as some kind of favorable contingency or chance happening (i.e. an event completely beyond the entrepreneur's control) that impacts the entrepreneur in a positive way. Luck is something that (sometimes) happens to you. It does not presuppose any search activity or prior knowledge on the part of the entrepreneur. Also, by contrast with luck, the role of contingencies in serendipity can come in more or less fortunate forms, such that unlucky incidents may sometimes constitute the contingent component of serendipity.

Having thus defined a framework in which serendipity can be understood as an inclusive element of entrepreneurial opportunity, it may help to place this framework in a broader context in which entrepreneurial discovery and creation occur. To do this, I next turn to examining serendipity in an evolutionary and institution-rich context. What emerges from this analysis is the sense that serendipity occupies an important place in some widely used and powerful ideas about social and economic dynamics.

Links between Serendipity and Evolutionary Theory, Socio-economic Institutions and Social Psychology

The Evolutionary Logic of Serendipity

Human systems are complex and evolving, creatively open-ended, and subject to several types of nonlinear behavior (Buchanan and Vanberg, 1990; Prigogine and Stengers 1984). Dooley and Van de Ven (1999) highlight four patterns in such dynamics (periodic, chaotic, white noise, or pink noise) which suggest different underlying generative mechanisms. Their analysis points to differences in the causes of complex behavior in evolving systems, and the necessity of using different process theories to understand and explain them. For some types of systems, seemingly innocuous and improbable serendipities may have far-reaching consequences because the system sometimes amplifies small events into large effects (Taleb 2007). That things *could* have turned out very differently in the face of equally plausible serendipities, or without the surprises of serendipity, is a fact that we will inevitably have to admit. In other types of systems, the vast majority of serendipities may merely be 'lost' events that, in effect, are swallowed up by other processes, eventually becoming errors of omission — just one more microscopic element in the cloudy, confusing human comedy. These are the serendipities that went sufficiently unattended to in the flow of human experience that they had no meaningful impact on the shape of future social artifacts (Garud and Karnoe 2001). Indeed, because all human descriptions of events depend on social processes that shape patterns of noticing and inattentiveness (Weick 1979), it is also possible that the fraction of serendipities that we (collectively) pay attention to are merely those few mindfully noted events that have been selected — perhaps retrospectively — for their meaningfulness. This is to say, that the concept of serendipity may sometimes be a useful tool for helping us generate good entrepreneurial stories out of vaguely understood, highly complex situations.

Yet, serendipity is not just a product of our mental limitations, which mask underlying processes that are deterministic in nature. Consistent with complex

systems thinking, it involves contingent interactions that have real ontological status in the world and are not just a matter of our inability to know the deeper structures that determine outcomes (Gould 2002). The kind of contingent, accidental, fortuitous features of history we commonly claim under the title 'serendipitous' are an irreducible and real property of evolutionary processes (Kantorovich and Neeman 1989). In principle, there is unpredictability in these processes. This does not necessarily mean that serendipity creates chaos in organizational histories. As noted by Dooley and Van de Ven (1999: 367), the common meaning of chaos is extreme disorder and confusion but from a mathematical point of view the opposite is true, and a large part of the work of chaos theorists has involved creating simple mathematical relationships that effectively model chaotic patterns (Mandelbrot and Hudson, 2006). Thus viewed, the 'accidental' event may be explained by prior interactions, and might perhaps be a recurring result of them, though any particular instance remains unpredictable.[4] Stephan Jay Gould, who made a career in evolutionary biology as a champion of contingency, quotes Darwin himself, saying, 'I believe in no fixed law of development … variability … depends on many complex contingencies' (Gould 2002: 1335). According to Gould:

> 'Over and over again, through the *Origin* [*of Species*], Darwin stresses that, for a large class of problems about species and interacting groups, answers must be sought in the particular and contingent prior histories of individual lineages, and not in general laws of nature that must affect all taxa in a coordinated and identical way.' (Gould 2002: 1335)

Since evolutionary theorizing is used so frequently in conceptualizing entrepreneurship, organizations, markets, and institutions, the same argumentation can be applied to them. This means that the histories of our organizations, markets, institutions, and other products of serendipitous entrepreneurship will tend to have a contingent nature. One result is that any view of economic and social evolution that gives a real place to serendipity implies that we cannot validate our present institutions, markets, and organizations by general principles but only as an outcome of contingent, historical processes (Rorty 1989). A careful appreciation of the role of serendipity therefore attenuates some of our accepted notions of how social and economic processes work, and has implications for how they might best be designed to work. A striking example of this occurs in thinking on socio-economic institutions, to which I turn next.

Socio-economic Institutions and Serendipitous Entrepreneurship

Few institutional thinkers have shown such a clear appreciation of the role of serendipity and entrepreneurship as Hayek (1960). Hayek didn't use the term 'serendipity' but he was clearly thinking about something very similar in the following passage:

> 'Humiliating to human pride as the insight may be, we must recognize that we owe the advance and even the preservation of civilization to a maximum of opportunity for accidents to happen.' (Hayek, 1960: 29)

The implication is that serendipitous entrepreneurship belongs with a clutch of ideas (i.e. unintended consequences and spontaneous orders) with a common root in the limits to human knowledge (Hayek 1974). Hayek makes a powerful argument for individual freedom based on this:

> 'If there were omniscient men, if we could know not only all that affects the achievement of our present wishes but also our future wants and desires, there would be little case for liberty … Liberty is essential to leave room for the unforeseeable and unpredictable; we want it because we have learned to expect from it the opportunity of realizing many of our aims.' (Hayek 1960: 29)

Important implications follow from this argument for the design (whether deliberate or evolutionary) of institutional frameworks that best leverage serendipities. First, individual entrepreneurs must allow enough freedom in their own plans that they might leverage serendipities. Relentless predefinition of entrepreneurial ventures, either in the form of business planning or 'vision', restricts the entrepreneur's opportunity to harness serendipity (contra Witt 2007). Next, the institutional constraints imposed by organizations on employees also need careful examination so that employees are allowed sufficient autonomy to pursue serendipitously discovered opportunities (Tsoukas 1996). In this regard, Hayek's arguments for freedom are just as relevant to private institutions as they are for public ones (see, for example, Schlender 1992 on Sony's practices). Furthermore, institutions vary in how well they encourage the retention of knowledge that might fund future serendipitous events. As noted by Garud et al. (1997: 348): 'Institutions are not mechanisms to sanction individuals for "failed" efforts, but are devices for the retention of knowledge from "experiments".' Institutions that support the retention of prior knowledge help access (future, possible) serendipities. Thus, organizations that value serendipity are motivated to take a different approach to 'failure' and 'waste', one that recognizes the option value inherent in establishing a stock of prior knowledge, even when that is a product of creative endeavors that ostensibly went 'wrong' (Garud et al. 1997).

Social Psychology of Serendipity in Entrepreneurship

Serendipity has an important role in the public image of entrepreneurship. Indeed, it may not be going too far to say that in popular perception these two concepts are tightly linked. The central issue is that, on the one hand, there is a popular image of the entrepreneur (particularly strong in the USA) which celebrates the idea that people with merit win out in the entrepreneurial process. Yet, on the other hand, there also appears to be an underlying popular hostility towards the idea that merit alone won the day. People prefer the idea that 'lady luck' also has an important role in the entrepreneurial process (regardless of the scientific accuracy of this preference). From this, we can discern that the popular image of successful entrepreneurship implicitly identifies an important role for serendipity in entrepreneurship, i.e. the social psychology of entrepreneurship involves lucky accidents as well as individual effort and sagacity.

This issue — that public perceptions of classes of individuals sometimes revolve around the concept of serendipity — prompted a fascinating discussion by Merton with regard to scientists (Merton and Barber 2004: 169). What Merton noticed was that, for reasons perhaps of threat, envy, or fairness, the public likes to attribute advances in science to 'the happy accident', precisely because it tends to pull the scientist off his/her pedestal and bring him/her back down to earth, thus making the work of great scientists more congenial with both the average individual's abilities and experiences of everyday life (in which serendipity plays a part).

Serendipity — which might be thought of as a fancy word for 'chance and smart fellows' (Merton and Barber 2004: 169) — thus has popular appeal precisely because it is an equalizing factor that enables people to vicariously imagine themselves as the scientist, or entrepreneur, who discovers or creates the next big thing.

This social psychology might be traced to notions of fairness (Rawls 1971), i.e. that whereas the lottery of birth may have treated people unfairly by gifting them with unequal skills and motivations, contingency rebalances the scales somewhat, precisely because of the synergistic interaction required between contingency, sagacity, and effort that is required to yield serendipity. Accident may be no use without effort and sagacity, but effort and sagacity are of little value without being complemented by fortunate accidents which can be leveraged — and these may be randomly distributed. The attractiveness of this image to the public psyche — that even the gifted need their lucky accidents — brings to mind the image of Greek gods rolling dice to determine human destinies. Thus, the popular appeal of entrepreneurship may be said to stretch just as far as the concept of serendipity stretches: the public likes its entrepreneurial heroes (popular figures like Bill Gates) to be worthy of their wealth by being meritorious; but only insofar as they were also recipients of good fortune. This combination centers popular perceptions of entrepreneurship squarely on the concept of serendipity, which serves to keep entrepreneurship both imaginatively accessible and enables its outcomes to be perceived as 'fair' in the popular psyche.

Implications for Research and Practice

Research Implications

In a recent comment directed at the marketing community, Brown (2005) summarized developments in what he called 'the science of serendipity' and urged marketing scholars to pay more attention to the 'incorrigible incalculability of commercial life', arguing that, 'the history of management in general and marketing in particular reveals that serendipity plays a significant part in the commercial equation' (Brown 2005). In this section of the paper, I suggest that the framework developed in this paper carries two significant implications for research in entrepreneurship that scholars might consider devoting more attention to understanding.

The first implication that the concept of serendipity highlights is that the discovery of some opportunities involves a genuine and non-trivial role for contingency as a trigger event. Consider the role of the taller tree in the discovery of trickle irrigation, the melting candy bar in the invention of microwave cooking, or the set of circumstances that led Simplot to make the acquaintance of Sokol. The importance of contingency in combination with other factors is easily underestimated (Gould 2002; Rorty 1989; Taleb 2002). Thus, of the three elements that constitute serendipity, it is contingency that has the most profound implications for how researchers think about entrepreneurial opportunity. The central issue is that our models of entrepreneurial phenomena typically involve treating contingencies as error terms that are essentially expunged from the analysis, controlled for, or assumed away. But what if the error term *is* the regularity? The concept of

serendipity suggests that it is the chance conversation, the idiosyncratic outlier, the unanticipated event, or the anomalous result that fund opportunity discovery and creation. If we relegate these terms to the category of errors, it leads to a systematic underestimation of a phenomenon that may be important to our understanding of opportunity discovery and creation.

Of course, if we acknowledge an important role for contingency, we are left with several difficult questions about drawing valid lessons based on scientific principles that implicitly or explicitly apply deterministic frameworks. As Denrell (2004) puts it:

> 'Underestimation of the role of chance also makes it difficult for individuals to draw valid lessons from history … there is always something special in the history of a firm, its strategy, and its organization that could be used to explain its performance record. Thus, even if success is the result of luck, it is possible to construct an "explanation" (Fischhoff 1975, 1982). The explanation may be entirely spurious, however.' (Denrell 2004: 933)

Brown (2005) argues that this has been the case in marketing, where everyone is familiar with serendipities in the history of Velcro, Corn Flakes, Band Aids, and Post-it-Notes, but there remains a systematic and misleading underestimation of the total impact of contingency (Pina E Cunha 2004). Marketing scholars have used extremely sophisticated statistical analyses, 'But for all this probabilistic prowess, our concepts hardly capture the sheer capriciousness of commercial life' (Brown 2005: 1231). Dooley and Van de Ven further argue that, in organization studies, the value placed on generalizability of research findings is based on 'the assumption that knowledge about commonalities … are of more interest, or value, than knowledge about differences … Aren't practicing managers as interested in what they cannot generalize, as well as what they can?' (Dooley and Van de Ven 1999: 370). The same arguments could be made for entrepreneurship research. And so what remains to be done is to incorporate a systematic role for contingency the way the literati, historians and biologists have married chance and necessity in their disciplines. In entrepreneurship, we have to find the right balance between attending to, and ignoring, contingencies. Serendipity might be fashioned into a useful concept for exactly this purpose.

The notion that some serendipities become venues for action, and some not, raises a second implication: when are serendipities more likely to occur and be acted upon (or not)? As suggested by McMullen and Shepherd (2006: 132), entrepreneurship involves acting on 'the possibility that one has identified an opportunity worth pursuing'. In the framework presented in this paper, I have made no particular assumptions about the 'hit rate' of serendipities, i.e. the framework is agnostic about what entrepreneurs *do* with their serendipitously discovered opportunities. However, whether serendipities are acted upon might be important for them to be considered serendipitous by others.[5] Also, it does seem that some entrepreneurs may be more exposed to serendipity and more likely to develop and create new businesses based on a serendipitously discovered opportunity (Ardichvili et al. 2003). These points beg questions about the process of generating and acting on serendipity.

While there are several frameworks one could use to examine this issue, one attractive framework is effectuation, because it suggests that a predisposition to flexibly exploit contingency is a central element in the behavior of expert entrepreneurs (Sarasvathy 2001). According to Sarasvathy (2007: 87):

> 'Surprises are usually relegated to error terms in formal models. Instead an effectual logic suggests they may be the source of opportunities for value creation, but only if someone seizes upon them in an instrumental fashion and imaginatively combines them with extant inputs to create new possibilities.'

In places, subjects in her experimental studies of expert entrepreneurs pointed directly to the role of serendipity in their reasoning processes, suggesting 'acknowledging and appropriating contingency rather than trying to avoid it' was an important part of their cognitive processes (Sarasvathy 2007). Moreover, effectual logic specifies that expert entrepreneurs take a particular approach to leveraging serendipities, one in which the entrepreneur actively attempts to create a context that attributes value to the conjectured opportunity in what Garud et al. (1997) termed 'tailoring fits', i.e. engaging in the design and development of market and institutional infrastructures (Sarasvathy et al. 2008; Garud et al. 2007). Of course, these actions highlight that the notion of discovery is somewhat different in the entrepreneurial realm than the scientific realm. In the scientific realm, discovery is (at least by standard accounts) about finding new phenomena and explaining them; in contrast, entrepreneurial discoveries involve shaping and creating value in social settings, which involves action repertoires such as interfering, orchestrating, tailoring, and so on.

What makes more experienced and expert entrepreneurs predisposed to harness serendipity? One possibility is that there is a non-trivial linkage between social network position and contingent events that roughly corresponds with boundary-spanning, gate-keeping, and brokering activities (Burt 1992; Obstfeld 2005). To the extent that more experienced entrepreneurs tend to have richer social networks, their network connections may expose them to information flows that make them more likely to encounter contingencies. This suggests that entrepreneurs may be able to engage in social networking behaviors that make it more likely that contingencies (hence serendipities) happen to them, i.e. they may deliberately engage in behaviors that semi-endogenize contingency. Sony's 'wandering chairman' serendipitously discovering a speaker system for the Walkman exemplifies how certain networking activities may make contingencies more likely (Garud et al. 1997). A second possibility is that the occurrence of serendipity may vary with entrepreneurial experience because serendipity is a function of prior knowledge, and more experienced entrepreneurs have larger pools of prior knowledge and better ability to access and filter it (Baron and Ensley 2006). Third, personality traits may play a role in receptiveness to serendipity and therefore the likelihood of leveraging it. Studies of entrepreneur psychology have found that, in general, entrepreneurs score higher on the variable 'openness to experience' than managers (Zhao and Seibert 2006). Openness to experience is defined as someone who is intellectually curious and tends to seek new experiences. Such individuals may be more receptive to, and welcoming of, contingent events and information, and thus more likely to view these events as opportunities for action. These are individuals who display a taste for the unexpected, for surprise (March 1982; Scitovsky 1976). The literature on expert cognition further suggests that, because experts routinize many cognitive tasks, they are more likely to have spare cognitive capacity available to handle non-routine tasks, which may also increase their receptivity to contingencies (Feltovich et al. 2006). Together these three factors suggest that future researchers might gain further

insight into entrepreneurial opportunity by examining to what extent experience and expertise make entrepreneurs more likely to encounter and exploit serendipities on their travels.

Implications for Practice

This study also has implications for several aspects of practitioner behavior. Many of these implications are not new, but worth reiterating nonetheless. A few of them are significantly different from existing literature, and worth consideration. First, entrepreneurs might wonder whether they should follow recommendations from the research on systematic exploration (Fiet 2002) or from research on spontaneous recognition (Shane 2000). The former suggests that entrepreneurs should make carefully considered, cost-effective investments in information that signals the value of opportunities (Fiet 2002: 3). By contrast, the latter suggests that 'people do not discover entrepreneurial opportunities through search' and that they can and will discover entrepreneurial opportunities without actively searching for them (Shane 2000: 451). What should an entrepreneur do? Serendipitous discovery suggests that *both* factors, in fact, matter. This is because an active search process may lead to the recognition of an opportunity, even though the opportunity is not what the entrepreneur set out to look for. This perspective allows practitioners to see that there may be a coherent rationale that unifies these otherwise conflicting perspectives.

A second implication of this paper concerns a long-running debate between commitment and flexibility. Remember that serendipitous discovery suggests that the entrepreneurial process will involve exploiting accidents and surprises that happen in the course of developing a venture. This raises the question of the optimal choice of, and investment in, systems and processes to detect and exploit serendipities. In a sense, the issue is how much commitment the entrepreneur should make to flexibility (Ghemawat and Costa 1994). This is a conundrum that many academics and practitioners have stubbed their toes on, so while a solution is clearly beyond the scope of this paper, a few remarks might be helpful. One is that the entrepreneur should expect business plans to change; in fact, evolving business plans may be something to strive for. It is also advisable that, early in the life of a new enterprise, the entrepreneur should use vision — if it is to be used at all — as a flexible umbrella under which serendipities may be incorporated (if they occur). The remarks by David Padwa in the introduction section of this paper stand as a reminder of how unwise it may be to let deterministic vision constrain the development of a new enterprise early in its life. Furthermore, even in very early-stage, resource-scarce enterprises, entrepreneurs need to find ways of cutting themselves enough slack to fund some continuing search activity. It has to be remembered that serendipity is a tripod that relies on some kind of resource-consuming search, as well as prior knowledge and contingency. Serendipity is not free.

Conclusion

Serendipity has been given little systematic attention by entrepreneurship scholars (Boussouara and Deakins 1999), yet it appears that it might be very relevant

to the entrepreneurial process once its relationships with concepts already employed in that literature are understood. To use an analogy, serendipity may be just the difference between a forgotten ball or an immortal homerun, but despite the fact that as a concept it exists on the knife edge of chance — and therefore always appears to be in danger of dissolution — serendipity is a rich idea that may be more central to the entrepreneurial process than so far has been recognized. In serendipity is the delight of the strange moment. But this does not make serendipity a residual, a leftover after the deterministic laws of the entrepreneurial process have run their course. Instead, serendipitous events — though by their nature individually unpredictable — may be worth understanding as a central, recurring feature of entrepreneurship.

Notes

The author would like to thank Raghu Garud and two anonymous *Organization Studies* reviewers for their helpful remarks on earlier drafts of this paper. Thanks, as always, also go to my usual cast of collaborators — you know who you are. The usual disclaimers apply.

1 Throughout the paper, I used the terms 'accident' and 'contingency' interchangeably.
2 Of course, whether the concept of 'discovery' is the most useful language for describing entrepreneurial opportunity is a matter of debate in the field (McMullen and Shepherd 2006). In this paper I take no particular position on this issue.
3 Throughout, I assume all opportunities are uncertain to some degree.
4 I would like to acknowledge the wisdom of an anonymous reviewer in pointing out the many different types of complex behaviors exhibited in evolving systems, and the possibility that a deeper understanding of these different patterns of behavior may indicate that some cases of serendipity are not, in fact, serendipitous, but may be predictable consequences of the behavior of the system.
5 I am grateful to Raghu Garud for pointing out this issue to me.

References

Alsos, Gry A., and Virpi Kaikkonen
2004 'Opportunity recognition and prior knowledge: A study of experienced entrepreneurs'. Paper presented at the Nordic Conference in Small Business Research.

Alvarez, Sharon A., and Lowell W. Busenitz
2001 'The entrepreneurship of resource-based theory.' *Journal of Management* 27: 755–775.

Ardichvili, Alexander, Richard Cardozo, and Ray Sourav
2003 'A theory of entrepreneurial opportunity identification and development'. *Journal of Business Venturing* 18/1: 105–123.

Barney, Jay B.
1997 'On flipping coins and making technology choices: Luck as an explanation of technological foresight and oversight' in *Technological innovation: Oversights and foresights.* Raghu Garud, Praveen R. Nayyar and Zur B. Shapira (eds). Cambridge: Cambridge University Press.

Baron, Robert A., and Mica D. Ensley
2006 'Opportunity recognition as the detection of meaningful patterns: Evidence from comparisons of novice and experienced entrepreneurs'. *Management Science* 52/9: 1331–1344.

Bernard, Claude
1865 *An introduction to the study of experimental medicine*, trans. H. C. Green, 1957. New York: Dover.

Bhidé, Amir
1996 'The road well travelled: A note on the journeys of HBS entrepreneurs'. Harvard Business School publication.

Boussouara, Mohammed, and David Deakins
1999 'Market-based learning, entrepreneurship and the high technology small firm'. *International Journal of Entrepreneurial Behaviour and Research* 5/4: 204–223.

Brown, Steven
2005 'Science, serendipity and the contemporary marketing condition'. *European Journal of Marketing* 39/11–12: 1229–1234.

Buchanan, James M., and Victor J. Vanberg
1990 'The market as a creative process'. *Economics and Philosophy* 7: 167–186.

Burt, Ron
1992 *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.

Caplan, Brian
1999 'The Austrian search for realistic foundations'. *Southern Economic Journal* 65/4: 823–838.

Cattani, Giovanni
2006 'Technological pre-adaptation, speciation, and emergence of new technologies: How Corning invented and developed fiber optics'. *Industrial and Corporate Change* 15/2: 285–318.

De Holan, Pablo M., and Nelson Phillips
2004 'Remembrance of things past? The dynamics of organizational forgetting'. *Management Science* 50/11: 1603–1613.

Demsetz, Harold
1983 'The neglect of the entrepreneur' in *Entrepreneurship*. Joshua Ronen (ed.), 271–280. Lanham, MD: Lexington Books.

Denrell, Jerker
2004 'Random walks and sustained competitive advantage'. *Management Science* 50/7: 922–934.

Denrell, Jerker, Christina Fang, and Sidney G. Winter
2003 'The economics of strategic opportunity'. *Strategic Management Journal* 24: 977–990.

Dooley, Kevin J., and Andrew van de Ven
1999 'Explaining complex organizational dynamics'. *Organization Science* 10/3: 358–372.

Feltovich, Paul J., Michael J. Prietula, and K. Anders Ericsson
2006 'Studies of expertise from psychological perspectives' in *The Cambridge handbook of expertise and expert performance*. K. Anders Ericsson, Neil Charness, Paul J. Feltovich and Robert R. Hoffman (eds), 41–68. Cambridge: Cambridge University Press.

Fiet, James O.
1996 'The informational basis of entrepreneurial discovery'. *Journal of Small Business Economics* 8/6: 419–430.

Fiet, James O.
2002 *The systematic search for entrepreneurial discoveries*. Westport, CT: Quorum.

Friedel, Robert
2001 'Serendipity is no accident'. *The Kenyon Review* 23/2: 36–47.

Gaglio, Connie M., and Jerome A. Katz
2001 'The psycological basis of opportunity identification: Entrepreneurial alertness'. *Journal of Small Business Economics* 16: 95–111.

Garud, Raghu, and Peter Karnoe
2001 'Path creation as a process of mindful deviation' in *Path dependence and creation*. Raghu Garud and Peter Karnoe (eds), 1–38. Philadelphia: Lawrence Earlbaum Associates.

Garud, Raghu, and Praveen Nayyar
1994 'Transformative capacity: Continual structuring by inter-temporal technology transfer'. *Strategic Management Journal* 15: 365–385.

Garud, Raghu, Cynthia Hardy, and Steve Maguire
2007 'Institutional entrepreneurship as embedded agency: An introduction to the Special Issue'. *Organization Studies* 28/7: 957–969.

Garud, Raghu, Praveen Nayyar, and Zur Shapira
1997 'Beating the odds: Towards a theory of technological innovation' in *Technological innovation: Oversights and foresights.* Raghu Garud, Praveen R. Nayyar and Zur B. Shapira (eds), 345–354. Cambridge: Cambridge University Press.

Ghemawat, Pankaj, and J. E. Ricarti Costa
1994 'The organizational tension between static and dynamic efficiency'. *Strategic Management Journal* 14/1–2: 59–75.

Gould, Steven J.
2002 *The structure of evolutionary theory*. Cambridge, MA: Belknap.

Hayek, Fredrich A.
1945 'The use of knowledge in society'. *American Economic Review* 35/4: 519–530.

Hayek, Fredrich A.
1960 *The constitution of liberty*. Chicago: University of Chicago.

Hayek, Fredrich A.
1974 'The pretence of knowledge'. *American Economic Review* 79/6: 3–7.

Hayes, Brian
2001 'Randomness as a resource'. *American Scientist* 89/4: 300–304.

Hodgson, Geoffrey M.
2006 'The ubiquity of habits and rules'. *Cambridge Journal of Economics* 21/6: 663–684.

Kantorovich, Aharon, and Yuval Neeman
1989 'Serendipity as a source of evolutionary progress in science'. *Studies in History and Philosophy of Science* 20/4: 505–529.

Kirzner, Israel
1997 'Entrepreneurial discovery and the competitive market process: An Austrian approach'. *Journal of Economic Literature* 35: 60–85.

Ma, Hao
2002 'Competitive advantage: What's luck got to do with it?' *Management Decision* 40/6: 525–536.

McMullen, Jeff S., and Dean A. Shepherd
2006 'Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur'. *Academy of Management Review* 31/1: 132–152.

Mandelbrot, Benoit, and Richard L. Hudson
2006 *The misbehavior of markets: A fractal view of risk, ruin and reward*. New York: Basic Books.

March, James G.
1982 'The technology of foolishness' in *Ambiguity and choice in organizations*. James G. March and Johann P. Olsen, 69–81. Bergen: Universitetsforlaget.

Merton, Robert K., and Eleanor Barber
2004 *The travels and adventures of serendipity: A study in sociological semantics and the sociology of science*. Princeton: Princeton University Press.

Mintzberg, Henry
1996 'Learning 1, planning 0'. *California Management Review* 38/4: 92–93.

Mintzberg, Henry, and James A. Waters
1982 'Tracking strategy in an entrepreneurial firm'. *Academy of Management Journal* 25/3: 465–499.

Obstfeld, David
2005 'Social networks, the tertius iungens orientation, and involvement in innovation'. *Administrative Science Quarterly* 50: 100–130.

Pascale, Robert T.
1984 'Perspectives on strategy: The real story behind Honda's success'. *California Management Review* 26: 47–72.

Pina E Cunha, Miguel
2004 'Serendipity: Why some organizations are luckier than others'. Working Paper, University Of Lisbon.

Prigogine, IIya, and Isabelle Stengers
1984 *Order out of chaos — man's new dialogue with nature*. Toronto: Bantam.

Rawls, John
1971 *A theory of justice*. New York: Belknap.

Roberts, Royston M.
1989 *Serendipity: Accidental discoveries in science*. New York: Wiley.

Ronstadt, Robert
1988 'The corridor principle'. *Journal of Business Venturing* 3/1: 31–40.

Rorty, Richard
1989 *Contingency, irony, and solidarity*. Cambridge: Cambridge University Press.

Sarasvathy, Saras D.
2001 'Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency'. *Academy of Management Review* 26/2: 243–263.

Sarasvathy, Saras D.
2007 *Effectuation: Elements of entrepreneurial expertise*. Cheltenham: Routledge.

Sarasvathy, Sars D., Nicholas Dew, Stuart Read, and Robert Wiltbank
2008 'Designing organizations that design environments'. *Organization Studies* 29/3: 331–350.

Schlender, Brenton R.
1992 'How Sony keeps the magic going'. *Fortune*, 24 February 1992: 76–82.

Schumpeter, Joseph A.
1934 *The theory of economic development*. Oxford: Oxford University Press.

Scitovsky, Tibor
1976 *The joyless economy: An inquiry into human satisfaction and consumer dissatisfaction*. Oxford: Oxford University Press.

Shane, Scott
2000 'Prior knowledge and the discovery of entrepreneurial opportunities'. *Organization Science* 11/4: 448–469.

Shane, Scott, and Sankaran Venkataraman
2000 'The promise of entrepreneurship as a field of research'. *Academy of Management Review* 25/1: 217–226.

Shaver, Kelly G., and Linda R. Scott
1991 'Person, process, choice: The psychology of new venture creation'. *Entrepreneurship Theory and Practice* 16/2: 23–42.

Silver, David.A.
1985 *Entrepreneurial megabucks: The 100 greatest entrepreneurs of the last 25 years*. New York: Wiley.

Stigler, George
1961 'The economics of information'. *Journal of Political Economy* 69/3: 213–225.

Taleb, Nassim N.
2002 *Fooled by randomness: The hidden role of chance in life and in the markets*. New York: Texere.

Taleb, Nassim N.
2007 *The black swan. The impact of the highly improbable*. New York: Random House.

Tsoukas, Haridimos
1996 'The firm as a distributed knowledge system: A constructionist approach'. *Strategic Management Journal* 17: 11–25.

Ucbasaran, Deniz, Paul Westhead, and Mike Wright
2008 'Opportunity identification and pursuit: Does an entrepreneur's human capital matter?' *Journal of Small Business Economics* 30/2: 153–173.

University of Pennsylvania
2004 Papers with serendipit* in the title. Online: downloaded 14 February 2007. http://www.garfield.library.upenn.edu/histcomp/serendipit_title/index-3.html.

Van Andei, Pek
1994 'Anatomy of the unsought finding. Serendipity: Origin, history, domains, traditions, appearances, patterns and programmability'. *British Journal of Philosophy of Science* 45: 631–648.

Venkataraman, Sankaran
1997 'The distinctive domain of entrepreneurship research' in *Advances in entrepreneurship research: Firm emergence and growth*. Jermoe A. Katz (ed.), 119–138. Greenwich, CT: JAI.

Weick, Karl E.
1979 *The social psychology of organizing*. Thousand Oaks, CA: Sage.

Weitzman, Martin L.
1998 'Recombinant growth'. *Quarterly Journal of Economics* 113/2: 331–360.

Wilson, T. L., and J. D. Hlavacek
1984 'Don't let good ideas sit on the shelf'. *Research Management* 27/3: 27–34.

Witt, Ulrich
2007 'Firms as realizations of entrepreneurial visions'. *Journal of Management* Studies 44/7: 1125–1140.

Zhao, Hao, and Scott E. Seibert
2006 'The big five personality dimensions and entrepreneurial status: A meta-analytical review'. *Journal of Applied Psychology* 91: 259–271.

Nicholas Dew

Nick Dew is an Assistant Professor of Strategic Management at the Naval Postgraduate School, Monterey. His research focuses on entrepreneurial cognition and industry evolution. He has a PhD in management from the University of Virginia and an MBA from the Darden school. Before entering academia, he spent eight years working internationally in the oil industry. His work has been published in several academic journals, including the *Journal of Marketing*, *Strategic Management Journal*, the *Journal of Business Venturing*, the *Journal of Business Ethics* and *Organization Studies*. He has received the Louis D. Liskin award for teaching excellence at NPS.
Address: Graduate School of Business and Public Policy, Naval Postgraduate School, Monterey, CA 93943, USA.
Email: ndew@nps.edu