

Creation and Pursuit of Entrepreneurial Opportunities: An Evolutionary Economics Perspective

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ABSTRACT. Considerable debate surrounds the concept of entrepreneurial opportunities. This paper approaches the opportunity concept from an evolutionary market process perspective. It argues that new opportunities for entrepreneurial activity frequently emerge as by-products of market competition. Agents may deliberately or unwittingly create opportunities. Organizational development and the evolution of industries are additional sources of new entrepreneurial opportunities. At the same time, they enable agents to acquire the skills required to exploit these opportunities.

KEY WORDS: business conceptions, industry evolution, market process, opportunities, spin-offs

JEL CLASSIFICATIONS: B25, D21, L10, L26, M13

1. Introduction

Clearly defining the scope and boundaries of its field has proved challenging for entrepreneurship research. Thinking about entrepreneurship in terms of opportunities, their discovery and exploitation is a promising approach to deal with this challenge. The opportunity concept allows entrepreneurship theory to build on earlier work in economics. At the same time, it helps put into perspective the dichotomy between “Schumpeterian” and “Kirznerian” entrepreneurship that still figures prominently in economics, and allows for an integration of corporate and other forms of entrepreneurial activity that do not come with new firm for-

mation. In spite of these promising features, a considerable conceptual debate surrounds the opportunity concept. This paper adds to the discussion by approaching the opportunity concept from an evolutionary market process perspective.

The historical origin of the opportunity concept, which emerged in the context of market process theories developed in the Austrian economics tradition, provides the conceptual point of departure for the present analysis. The genesis of the concept is not just interesting on historical grounds. Rather, recognizing that individual entrepreneurial activities are embedded in market processes is highly useful to clarify the nature of opportunities. The crucial point is that entrepreneurial opportunities are mostly created by the activities of human agents. Individuals may deliberately create opportunities, but often opportunities are the unintended outcomes of activities motivated by other objectives. To a large extent, they emerge from competitive market processes. Further insights into the creation of opportunities can be derived from evolutionary approaches to organizational development, which highlight both the heterogeneity of firms and the subjective element in pursuing opportunities. Not only the initial perception of the entrepreneurial opportunity, but also the further development of the entrepreneurial venture, are inherently shaped by subjective, idiosyncratic factors. These idiosyncrasies condition the creation of new opportunities in the developing firm, and also the firm’s ability and willingness to pursue them. In addition, creation, perception and pursuit of opportunities are influenced by industry evolution. Empirical evidence indicates that basic industry characteristics shape the extent and

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kind of entrepreneurial opportunities as well how these change over time. Again, the development of an industry naturally leads to the creation of new opportunities; it also tends to bring about new potential entrepreneurs capable of pursuing these opportunities.

The key contribution of the present analysis is to embed the opportunity concept in the context of evolution in markets, firms and industries. The individual entrepreneurial pursuit of opportunities is thus linked to the broader economic context, which establishes a conceptual connection between entrepreneurship research and evolutionary economics. In this perspective, entrepreneurial opportunities are neither assumed as exogenously given nor as entirely subjective and self-created by the entrepreneur. Instead, opportunities are understood as the logical outcomes of dynamic economic processes. In turn, their pursuit is an important driving force of sustained dynamic change in the economy.

The remainder of the paper is organized as follows. Section 2 discusses the origins of the opportunity concept in Austrian economics. Section 3 relates entrepreneurial opportunities to the evolutionary market process. It discusses the emergence of new opportunities as by-products of competitive processes and the motivations underlying opportunity creation. Section 4 presents links from subjective opportunity perception to the specific way opportunities are pursued in the developing entrepreneurial venture, indicating how organizational aspects condition the creation of new opportunities. Section 5 sketches findings on industry evolution to trace the dynamics of opportunity creation over the life cycle of industries. Section 6 concludes.

2. The Austrian roots of the opportunity concept

The roots of the opportunity concept are found in Austrian economics. The concept is implicit already in Hayek (1945) who alludes to the role of arbitrageurs discovering, exploiting, and eliminating local differences in the prices of goods and services. The insight that agents differ in their “knowledge of the particular circumstances of time and place” (Hayek, 1945, p. 522)

provides the cornerstone of Hayek’s characterization of the market process. This subjective, localized knowledge of individual agents is reflected by competitive prices signaling relative scarcities and how these differ over time and between locations. Price differences give rise to arbitrage opportunities, and the exploitation of these opportunities equilibrates the market. Emphasizing the self-regulating capacity of the market process, Hayek does not seem to see as potentially problematic the underlying capacity of agents to discover and pursue opportunities. He trusts individual market participants to reliably act on their recognition, based on their subjective knowledge, of arbitrage opportunities. With this optimistic view of the market process, Hayek remains faithful to the tradition of liberal economic thinkers. At the same time, there is no specific role for the entrepreneur in his view of the market process.

Building on the prior work of von Mises (1949), this changes in Kirzner (1973, 1997) where the entrepreneur takes center stage. According to Kirzner, the defining characteristic of entrepreneurs is that they are “able to perceive opportunities for entrepreneurial profits; that is, they are able to see where a good can be sold at a price higher than that for which it can be bought” (Kirzner, 1973, p. 14). These opportunities derive from imperfect knowledge, i.e., exactly from the subjective differences in knowledge of time and place that were already emphasized by Hayek. Kirzner (1997) suggests errors as an additional source of opportunity. Entrepreneurial activity accordingly helps correct earlier shortcomings in judgment. In this way, the competitive market process is seen not only as self-regulating, but also as self-correcting – it thus becomes a substitute for perfect individual rationality and foresight.

For Kirzner, all human behavior has an entrepreneurial element. As a hypothetical, analytical device, he introduces the “pure entrepreneur” whose “*entire* role arises out of his alertness to hitherto unnoticed opportunities” (Kirzner, 1973, p. 39, emphasis in original). The pure entrepreneur does not initially own any resources. She is an arbitrageur who buys goods or resources and is able to sell them at a profit, because she is more adept or quicker than others

in reacting to imperfections or changes in the market. Neither production activities nor new firm formation are defining elements of Kirzner's notion of entrepreneurship, which is developed in the context of a pure exchange economy. Producers nonetheless qualify as Kirznerian entrepreneurs because (and to the extent that) they buy bundles of resources and process them into goods that can then be sold at a higher price than what had to be paid for the original bundle. It is the element of (intertemporal and combinatorial) arbitrage present in profitable production activities that makes them entrepreneurial in the Kirznerian sense.

Entrepreneurs are thus defined by their alertness toward unexploited – and exogenously given – opportunities that are reflected in price differences. Innovativeness, in the sense of bringing novelty into the economic sphere, is neither necessary nor sufficient for Kirznerian entrepreneurship. Alertness to the information signaled by price differences is more important for the entrepreneur than superior substantive (e.g., technological) knowledge or creativity. Nor does Kirzner discuss how the entrepreneur pursues the opportunity once it has been discovered. Specifically, there is no role for the firm organization in his scheme (Witt, 1999).

With Joseph Schumpeter, there is another eminent Austrian – at least by birth¹ – among the pioneering thinkers on entrepreneurship. Schumpeter does not explicitly feature the opportunity concept. Instead, his point of departure is the notion of innovation characterized as “new combination” (Schumpeter, 1911). The entrepreneur is an individual who creates a new combination and pursues it in the market (possibly but not necessarily through forming a new firm). Clearly, the creation of a new combination can be interpreted as the creation of an entrepreneurial opportunity. If interpreted in this way, Schumpeter's approach differs from the Hayek–Mises–Kirzner tradition in that opportunities are not pre-supposed for entrepreneurial activity to occur, but are created by the innovative entrepreneur herself.

This interpretation of the Schumpeterian entrepreneur as a creator of opportunities is limited to the narrow economic market sphere,

however. At a more fundamental level of analysis, even the Schumpeterian entrepreneur is an exploiter of pre-existing opportunities (Witt, 2002). Schumpeter makes a strong distinction between entrepreneurs and inventors. Innovative entrepreneurs are by no means required to be inventive in a technological sense, but the entrepreneur (as such) exploits an existing opportunity by bringing it into the economic sphere. Put differently, while the Kirznerian entrepreneur discovers and pursues opportunities that exist within markets (and are reflected in the price system), the Schumpeterian entrepreneur discovers opportunities that exist outside the economic sphere (and are not yet reflected in the price system) and pursues these opportunities by bringing them into the marketplace. Because of this difference, entrepreneurial activities have a fundamentally different effect on the market process: while in Kirzner's view they are equilibrating forces, Schumpeter sees them as the crucial drivers of dis-equilibrating economic development.²

There are pronounced differences between Schumpeter's early work discussed above and his later position on innovation and entrepreneurship. Schumpeter (1942) suggests that in the course of economic development, the individual entrepreneur becomes increasingly unimportant. Instead, corporate firms with R&D activities of their own, driven by the incentives provided by the patent system, take over as the prime drivers of technological and economic change. Irrespective of whether this prediction was accurate, Schumpeter's later position reflects a fundamentally changed view of the nature of opportunities. With the emphasis on innovation through corporate R&D, opportunities are no longer seen as exogenously given even in the technological sense, but they are created by the innovating firm itself.

The crucial implication of the Austrian origins of the opportunity concept is that the discussion of entrepreneurial opportunities is informed by an interest in competitive market processes. In this way, individual entrepreneurial activities are related to the level of markets and industries. In the next section, concepts from evolutionary economics will be adopted to extend this position and to reconsider

the contemporary debate on entrepreneurial opportunities.

3. The evolutionary market process and the nature of entrepreneurial opportunities

The Austrian legacy is clearly visible, and is readily acknowledged, in the contemporary treatment of the opportunity concept in entrepreneurship research. However, entrepreneurship researchers have not converged on a universally agreed upon definition of entrepreneurial opportunities, and the alternative views incorporate Austrian concepts in different ways. In particular, there are conflicting views as to whether entrepreneurial opportunities exist in an objective way or whether they are more subjective in nature, being actively created by the entrepreneur herself.

Shane (2003, p. 4) defines entrepreneurship as “an activity that involves the discovery, evaluation and exploitation of opportunities to introduce new goods and services, ways of organizing, markets, processes, and raw materials through organizing efforts that previously had not existed.” In this view, opportunities exist prior to and independent of the entrepreneur’s discovery and subsequent actions. They arise from factors such as technological, social, and demographic change. This definition is very close to Kirzner’s in stressing the discovery of existing opportunities, while forms of opportunities are distinguished along the lines of Schumpeter’s (1911) types of innovation.

Shane (2003, pp. 19–22) furthermore introduces a distinction between “Kirznerian” and “Schumpeterian” opportunities based on whether or not an opportunity involves the introduction of new information or only differential access to existing information. However, without a more specific characterization of what kind of information (or knowledge) is referred to, this distinction remains insufficient. To argue that “Schumpeterian” opportunities involve the creation of new knowledge abstracts from Schumpeter’s prominent distinction between inventors and innovators. Also, a distinction between newly created knowledge and unevenly divided knowledge is hard to make operational if (“Kirznerian”) opportunities for arbitrage are

often the direct results of prior (possibly erroneous) decisions by other agents that change the relative scarcity of particular goods and resources. In the absence of change, all opportunities for arbitrage would rapidly dry up, and it is (new) knowledge about these changes that allows for arbitrage. All opportunities are thus created by new knowledge. The crucial difference between opportunities for arbitrage and opportunities for innovation is the extent to which the existence of an opportunity is signaled by the price system, i.e. whether or not the new knowledge exists in the market or only outside of markets.

It has to be noted that for Shane, the ability to discover opportunities involves more than merely alertness. In contrast to Kirzner, discovery of opportunities is not (only) a question of personality traits. Rather, to discover an opportunity a potential entrepreneur needs to be both exposed to related information and capable of recognizing it as an opportunity. For the latter, relevant prior knowledge is seen as crucial, which has been accumulated over the entrepreneur’s past experience. Differences in prior knowledge also condition how exactly an opportunity is interpreted, and how it is translated into products and entry into specific markets (Shane, 2000).

Shane (2003, p. 42) stresses that opportunities may exist as objective realities even though their discovery may require a creative act by the entrepreneur. In contrast, Sarasvathy et al. (2003) dispute the objective nature of all entrepreneurial opportunities. They distinguish three types of entrepreneurial opportunity, which they relate to three different views of market coordination in economics. Opportunity “recognition” is linked to the tradition of neoclassical economics. Recognition of opportunities is sufficient if both demand and supply factors “exist rather obviously” (Sarasvathy et al., 2003, p. 145), and if the entrepreneurial venture exploits already existing markets. Arbitrage and franchising are given as examples of this kind of opportunities. If either demand or supply factors are absent in the market prior to the entrepreneurial venture, then the entrepreneurial activity is characterized as opportunity “discovery.” New products for well-known needs

and desires, as well as new applications for existing technologies, fall into this category, which the authors relate to the Austrian tradition of market process theory. Finally, opportunities may be actively created by the entrepreneur herself. According to Sarasvathy et al. (2003), this happens when neither demand nor supply exist prior to the entrepreneurial venture, but both sides of the market have to be created anew. This view of active creation of opportunities is associated to Buchanan and Vanberg (1991) who explore parallels between economics and complex systems theory. These authors suggest that markets are creative processes in which agents create new goods in unforeseeable ways.

The core of Sarasvathy et al.'s (2003) position is that entrepreneurial activity may require the active creation of an opportunity, and market conditions determine the extent to which opportunity creation is necessary. However, Sarasvathy et al.'s (2003) mapping between kinds of opportunities and economic positions appears unfortunate. For example, Kirzner's defining case of entrepreneurship, arbitrage, ends up being linked to the neoclassical tradition that he strongly objects to. Generally, a distinction based on whether none, one, or both sides of the market have to be "made" by the entrepreneur appears poorly suited as a foundation for classifying entrepreneurial opportunities.

For a closer look at Sarasvathy et al.'s (2003) classification of opportunities, it is helpful to start with the conception of competition and the market process adopted by evolutionary economists.³ Evolutionary economics builds on the Austrian approach by embracing subjectivism and a process orientation. In their characterization of individual human agency, evolutionary economists join the Austrian school in recognizing the limitations of the traditional economic approach assuming rationally optimizing, representative agents. Instead, evolutionary economics allows for subjective cognitive framing, satisficing, learning, and creativity in human behavior. The population thinking underlying evolutionary thought, i.e., the emphasis on the heterogeneity of similar entities such as firms in an industry, is the analog of Austrian subjectiv-

ism at the organizational level. In terms of its process perspective, evolutionary economics goes beyond the (narrowly conceived) Austrian approach in that not only the coordinating power of the competitive market process is highlighted, but also its capacity to trigger dynamic change and innovation. The evolutionary conception of the market process thus has a direct link to Schumpeterian entrepreneurship and innovation.

The evolutionary market process is driven by the feedback provided by price information. Given the evolutionary assumptions on human behavior, changes in prices need not be due to errors in judgment, but may arise for a variety of reasons including changing tastes and consumer learning.⁴ For potential entrepreneurs, increasing prices signal opportunities for profitable entry. For active producers, price changes provide information that the demand for their products has changed. In particular, falling prices show active producers that their performance is declining, which may cause them to increase their innovative efforts. Innovation is then the consequence of deteriorating performance. In contrast, successful firms can use their profits to finance further innovative activities, in which case past success may also breed future success. Either way, innovation is conditioned by performance, which in turn is affected by the activities of competitors. Consequently, one firm's innovation may be the unintended result of another firm's earlier innovation. At the same time, each innovation leads to new changes in prices and market imbalances. While having adverse effects on direct competitors, innovations frequently create opportunities for (potential) producers of complementary and vertically related goods and services.

In the evolutionary view, market competition accordingly is a dynamic process in which the actions of the various producers are continually in flux and mutually interdependent. Unless the ensuing opportunities are all exploited by incumbent firms, the market process also brings about opportunities for entry of new producers. In this way, the dynamic, open-ended market process, which has been characterized as self-organizing (Witt, 1985), continually generates a stream of new entrepreneurial opportunities.

A basic insight from adopting an evolutionary market process perspective is that at the aggregate level, the vast majority of entrepreneurial opportunities are created by human activity rather than pre-existing exogenously. (Opportunities stemming from natural disasters etc. are an exception.) They often arise in the market process itself, being the (mostly unintended) consequence of some agent's prior activities. Further opportunities are created outside the market sphere (for example, opportunities based on new inventions and scientific discoveries). To ask whether opportunities exist exogenously or are actively created therefore seems little meaningful. Essentially, the controversy on entrepreneurial opportunities is about whether or not the opportunity is exogenous to the entrepreneur's *own* activity, i.e., whether the entrepreneur herself creates the opportunity or some other agent.

However, this modified distinction according to who creates an opportunity is not yet sufficient. Even if the entrepreneur created the opportunity through her own invention or market activity, it is important to understand the motivation underlying this creation. Quite possibly, as in the case of a targeted technological development, the motivation behind the creation of an opportunity was the discovery of what may be called a "higher-order opportunity": an opportunity to create the conditions for an entrepreneurial act by means of some targeted activity. In this sense, the discovery of an (individually) exogenous "higher-order opportunity" preceded the creation of the opportunity. The entrepreneurial opportunity under consideration can thus be considered both as created and discovered. It is created in that the conditions for the entrepreneurial act are established by the entrepreneur herself, which often requires substantial levels of ingenuity, effort, and perseverance. *Ex ante* it is uncertain whether the attempt of establishing these conditions will eventually be successful. At the same time, the opportunity is discovered because in some way, however abstract and idiosyncratic, the entrepreneur is motivated by an initial insight that she may be able to create these conditions, even though this may not have been obvious for any other agent than the entrepreneur.

Opportunities may also arise from the entrepreneur's own activity without this activity being directed toward entrepreneurial purposes. For example, an academic researcher may find a new material or genetic function that – in addition to addressing the research question that motivated the research – gives rise to an entrepreneurial opportunity. Likewise, a high-technology firm may run research facilities (such as the Bell Labs or Xerox's PARC) that are independent of the company's targeted development efforts, but whose results nonetheless open up new entrepreneurial opportunities. These opportunities are arguably created independently of the prior discovery of "higher-order opportunities."

It is by no means guaranteed, however, that such "serendipitous opportunities" are also *discovered* by their creators. Furthermore, creators of opportunities are not necessarily the only ones able to discover them. For example, an academic researcher may present her findings at a conference, and a member of the audience then sees an opportunity for commercial application that the researcher herself is unaware of.

Serendipitous opportunity creation is not limited to technological discoveries. Product innovators are sometimes unable to foresee all applications of the product before it is introduced to the market. Their innovation then creates entrepreneurial opportunities, possibly ones that they are unable to discover or to pursue themselves. Accordingly, even when opportunities are created by the agent herself, it is still important to distinguish existence of an opportunity and its discovery, as Shane (2003) does in his linear depiction of the entrepreneurial process.

To illustrate these points, it is helpful to refer to some cases of real-world entrepreneurial opportunities. As a first example, consider the improved microscope innovated by the German firm Carl Zeiss around 1870 (for a detailed account, cf. Buenstorf and Murmann, 2005). Carl Zeiss had founded a small mechanical workshop that, among other things, produced simple microscopes that he sold to local university researchers. These microscopes used the standard design of the time, and were made in similar ways by numerous competitors. Zeiss was thus subject to strong competitive pressure,

which was moreover increasing due to the incremental innovations made by others. However, Zeiss was convinced that decisive improvements in microscope technology could only be made if the underlying laws of optics were thoroughly understood. He therefore initiated a cooperation with university physicist Ernst Abbe who entered into the firm's service and developed an analytical theory of the microscope. Based on Abbe's findings, Zeiss was indeed able to produce vastly improved microscopes, enabling his firm to become Germany's dominating optics firm by the early 20th century.

In terms of the above discussion, it could be argued that the opportunity for making theory-backed microscopes did not exist before Abbe, on Zeiss' initiative, developed the theory of the microscope. In this sense, Zeiss deliberately created the opportunity that he subsequently exploited with his firm. Since there was no theoretical foundation to start from, Zeiss' achievement even went beyond that of a Schumpeterian innovator who "merely" brings existing inventions to a commercial application. Yet Zeiss was motivated by the conviction that an opportunity could be created, which presupposes his discovery of a "higher-order opportunity" in the above sense. Moreover, since the deficiencies of the available microscopes were well known, any other individual knowledgeable in optical instruments and their manufacturing could in principle have made the same discovery. In this sense, the "higher-order opportunity" pursued by Zeiss pre-existed in an objective way.

The invention and innovation of the mountain bike in the early 1970s provides a second illustrative example (cf. Buenstorf, 2003). The basic design configuration of the mountain bike gradually evolved over a period of several years in a user group setting in Marin County, California. The group initially engaged in competitive downhill races, using what they called "clunkers": homemade bicycles assembled from a variety of components found mostly in basements and junkyards. Years later they also mounted derailleur gearshifts to their bicycles and began to ride cross-country in addition to only racing downhill. This fundamentally

changed the character of the sport as well as the bicycles, which now became more universally usable. Based on bricolage and trial-and-error testing in the races, the key design features of the mountain bike, including frame geometry, gearshift with thumb shifters, cantilever brakes, and straight handlebar, stabilized over time. Originally, the group members did not pursue any commercial interest, but rather considered themselves part of the hippie subculture. Beginning in 1976, individual group members started lifestyle firms producing frames or assembling small numbers of bicycles. Finally, in 1982, with Mike Sinyard's Specialized firm, the first successful mass-market mountain bikes were introduced by a producer that had no links to the innovating user group.

How can the mountain bike case be made sense of in terms of the opportunity concept? Clearly, in this case an opportunity for profitable entry was actively created by human behavior. Before the innovating user group in Marin County took up its downhill races, there was no product, no technology, and no demand for what would become the mountain bike. Even the eventual use of the mountain bike as a versatile cross-country bicycle only emerged over time. Thus, an entrepreneur like Mike Sinyard could not have discovered the opportunity to sell mountain bikes before 1970, as the opportunity did not exist yet. Perhaps he would have been able to create it by inventing the mountain bike himself, but it is not clear whether this would have been successful without the group setting in which mountain biking developed. As opposed to the Zeiss example, however, the creation of the opportunity by the Marin county clunker riders was not driven by their discovery of a "higher-order opportunity." For years, the group members did not expect their "clunkers" to have any appeal to outsiders. As one of them (Kelly, 1979) put it: "This sport may never catch on with the American public, but its originators couldn't care less." And when the potential demand for the new bicycle, i.e., the entrepreneurial opportunity it represented, was eventually discovered, with Sinyard it was an outsider who first pursued the opportunity on a significant scale.

In summary, three points regarding the nature of entrepreneurial opportunities emerge

from the above discussion. First, opportunities are almost invariably created by human activity, in part by activity outside the market sphere, in part by economic activity within markets. However, the agent who pursues an opportunity need not be the one who created it. Second, if an opportunity is created by an entrepreneur herself rather than by another agent, this creation may nonetheless be based on the discovery of a “higher-order opportunity” – an opportunity to create the opportunity – that existed independently of the entrepreneur and that could in principle have been discovered and pursued by others. Third, particularly when individuals create opportunities without being motivated by the discovery of a “higher-order opportunity,” the ability to discover the newly created opportunity need not be limited to themselves. Again, in this sense the opportunity can be said to exist objectively. Thus, the present attempt at approaching the opportunity concept from an evolutionary market process perspective suggests that no contradiction necessarily exists between the active creation of opportunities and their objective existence (or at least that of “higher-order opportunities”).

4. Entrepreneurial business conceptions and the perception–pursuit nexus

Evolutionary economists have a keen interest in understanding the dynamics of firm organizations, an issue that has received little attention in Austrian economics (Witt, 1999). The evolutionary approach to organizations emphasizes the heterogeneity of firms as well as the impact of subjective entrepreneurial behavior on organizational development. This section explores how the characteristics of firm organizations affect the pursuit of entrepreneurial opportunities, and how they contribute to the creation of new opportunities.

The evolutionary approach to organizational change was pioneered by Nelson and Winter (1982). Building on the Carnegie school of organization science, they characterize firms as governed by organizational routines. Firms are argued to “remember by doing,” with the organizational routines – recurring patterns of organizational processes – embodying the firm’s

“memory.” Routines, which are typically based on the repeated interaction of several firm members, enable coordinated activity because they make the behavior of firm members mutually predictable. The knowledge reflected in the firm’s routines is frequently tacit in nature; the firm members holding it may be unable to express it verbally. As a consequence, routines are difficult to transfer to new contexts within or outside the firm. For outsiders, they are even harder to imitate. Routines thus add to the heterogeneity of firms.⁵

The emergence of organizational routines, and their relationship to purposeful entrepreneurial activity in the fledgling firm, have long remained unresolved issues. A useful approach to deal with these issues was developed by Witt (1998) in his theory of cognitive leadership. According to Witt, new entrepreneurial ventures are based on a “business conception,” i.e., the entrepreneur’s subjective interpretation of the entrepreneurial opportunity and the basic approach to exploit it. Business conceptions are largely based on intuition and tacit knowledge. Conceptually, the notion of business conceptions builds on findings of the cognitive sciences highlighting the effects of past experience, memory and current intentions on how agents perceive situations and what problem-solving approaches they employ.

The evolutionary work on organizations suggests that the activities and development of existing organizations are themselves sources of new entrepreneurial opportunities. The entrepreneur’s business conception, informed by her subjective perception or “framing” of an opportunity, conditions the decision whether to pursue the opportunity and, if so, how to pursue it. This implies that the discovery and exploitation of opportunities are inextricably linked. In other words, a perception–pursuit nexus characterizes entrepreneurial ventures; the subjective framing of the opportunity shapes the entrepreneur’s interpretation of the firm’s objectives and approaches (its “mission”). This argument is in line with both Austrian subjectivism and empirical evidence from the entrepreneurship literature (Shane, 2000). The framing effects of the subjective entrepreneurial business conception are not limited to the founding stage, but

also condition the subsequent development of the entrepreneurial firm.

Entrepreneurial business conceptions have important coordinative and motivating functions in the firm (Witt, 1998). Successful entrepreneurs are able to share the business conception with their employees. This can be done through verbal communication, but even more importantly through repeated personal interaction, which allows for the diffusion of nonverbal tacit knowledge through observational learning and the imitation of role models. A shared business conception provides meaning to the firm's routines, thus facilitating the coordinated transfer and adaptation of routines within the firm. This helps prevent routines from becoming "routine" in the sense that, while being taken for granted by the firm members, they are essentially decoupled from the firm's objectives. If the entrepreneur is successful in spreading her basic interpretation of the firm's objectives and approaches, she can thus ensure that the activities of individual firm members are consistent with each other and with the firm's overall mission. At the same time, a universally shared and internalized business conception is argued to have a substantial motivational impact. Understanding and identifying with the firm's objectives adds to firm members' intrinsic motivation and helps keep opportunistic behavior in check (Witt, 1998).

The ongoing framing effects of a shared business conception condition the firm's capacity to discover new opportunities, which is a prerequisite for diversification through entry into new technologies and markets. In this context, the shared business conception is likely to act as a double-edged sword. On the one hand, the interpretative framework provided by the conception may compromise the firm members' ability to perceive uncertain environmental changes as opportunities rather than threats. On the other hand, it sharpens the firm members' perception whether newly perceived opportunities are compatible with the firm's overarching objectives and worth pursuing in the firm context, thus helping to pre-select among the variety of potential new activities into which the firm could enter. If employees detect promising opportunities that are inconsistent with the

business conception and rejected by the firm's leadership, they may decide to leave the firm and pursue the opportunity on their own in a spin-off. The spin-off phenomenon will be discussed in more detail in the next section.

Given the importance of direct interaction and observational learning for communicating the tacit elements of the business conception, sharing and sustaining it becomes increasingly difficult as the firm grows. Witt (2000) argues that the extent to which the business conception's role can be sustained and renewed in the growing firm is an important component of entrepreneurial performance.

One option for the growing firm is to decentralize coordination and decision-making by splitting up the leadership task among a group of "sub-entrepreneurs" who are in close contact with the firm's leadership and communicate the business conception to their subordinates who are not. These employees face high levels of responsibility and autonomy in their respective tasks. In essence, they perform entrepreneurial functions within their scope of autonomy, which allows them to attain an "entrepreneurial attitude" and refine their judgment and decision making skills. They are moreover in a favorable position to detect new opportunities created within the firm or in its environment. Through this on-the-job learning, employees acquire the capacity to start their own businesses. Thus, while facilitating the coordination of activities in the growing firm, the subdivision of leadership tasks also breeds new potential entrepreneurs (Buenstorf and Witt, 2006).

These theoretical conjectures resonate with Monica Higgins' (2005) account of the crucial role that the "Baxter Boys" played in the emergence of the US biotechnology industry. Higgins shows that the leadership of Baxter International, a US manufacturer of medical supplies, instilled an "entrepreneurial career imprint" in its young executives by assigning them to challenging yet largely autonomous jobs. The attitude and skills thus obtained turned Baxter employees into sought after managers for the newly emerging biotechnology industry.

The evolutionary work on organizational development implies that the firm's present

activities condition its ability to detect opportunities for entry into new activities. At the same time, the firm's employees acquire entrepreneurial skills through on-the-job learning. They may also be exposed to entrepreneurial opportunities – possibly ones created by the firm's own activities – that the firm itself is unable or unwilling to pursue. Thus, existing firm organizations are a source of both entrepreneurial opportunities and potential entrepreneurs.

5. Industry evolution and entrepreneurial opportunities

Similar to firm development, the evolution of industries changes the nature of existing opportunities and also creates new ones. Industry evolution has been among the most prominent objects of research in evolutionary economics in recent years. The ensuing work is related to the Austrian tradition in its interest in the dynamics of competitive market processes. However, its focus is less on the coordination of supply and demand in markets than on the entry, growth, and exit of firms resulting from market competition, as well as changes in the nature of innovations. The research on industry evolution is relevant for entrepreneurship scholars because it has clear-cut implications for the existence as well as the perception and pursuit of opportunities.

Not all industries follow the same evolutionary path. The most widespread pattern of development has become known as the “industry life cycle” (Klepper, 1997) in which the number of active firms increases initially, but then starts to decline drastically while the market is still growing – the so-called “shakeout” phenomenon. Distinct developmental phases can be distinguished in the life cycle dynamics. At first, the market for the product defining the new industry is small. Product designs are simple and in flux, with further product innovations being highly unpredictable. A large number of typically small firms produce heterogeneous variants of the product, and the emphasis of producers' innovative efforts is on product rather than process innovations. In the second phase of the life cycle, market volume is increasing and the basic design of the product stabilizes (a

dominant design often emerges). Production processes are becoming increasingly sophisticated, being based on the use of specialized machinery. The shakeout in the number of active firms falls into this growth phase, as the incidence of new entry declines while many of the existing producers exit from the industry. In the third, mature, phase of the industry life cycle, growth rates of aggregate output decline and new entry dries up. Product innovation further loses significance in the competitive process relative to process innovation. Eventually, with new substitutes becoming available, the industry may decline altogether, and a new cycle begins in the industries defined by the substitutes.

To account for the regularities of the industry life cycle, Klepper (1996) develops a theoretical model driven by increasing returns to process R&D. As incumbent firms grow in size and become more efficient, new entry becomes increasingly difficult, while firms with little success in the innovation process are leaving the market. This is consistent with the shakeout phenomenon. Furthermore, given a decreasing number of active firms and increasing incentives for process R&D, the shift from product to process innovations is explained in the framework of the Klepper model.

The life cycle regularities in shakeout industries have direct implications for how the frequency and nature of entrepreneurial opportunities change over time. Early concentration of entry and the presence of first mover advantages indicate that there are more and better opportunities early in the industry's history. On the other hand, these early opportunities come with higher uncertainty, as the rate and direction of market growth are harder to predict. The higher degree of uncertainty will deter some potential entrepreneurs contemplating entry into the industry, and likewise potential financiers. The shift toward process innovations over the life cycle is associated with decreasing rates of new entry. This suggests that, in general, the scale-enhancing changes to the production process do not open up opportunities for new entry, which is mostly limited in scale. However, with the increasing use of specialized machinery in the maturing industry, new opportunities in upstream (supplier)

markets are created. Similarly, the evolutionary dynamics of an industry may create opportunities in horizontally related and downstream (user) industries. Finally, even the shakeout itself gives rise to entrepreneurial opportunities. For example, vacant plants of failed incumbents may provide the impetus for the formation of some of the later entrants.⁶

As mentioned above, not all industries are well described by the life cycle pattern of shakeout industries. A substantial fraction of industries does not experience a shakeout, but allows for sustained entry based on the specialization of producers, which can proceed along different dimensions (Klepper, 1997). Submarkets within the industry are an important dimension of specialization. Empirical evidence suggests that specialization along submarkets is feasible in industries where there are no pronounced economies of scope between product variants.

A prominent example is the laser industry. There are many different types of lasers, and over the past four decades, progress in laser research has given rise to a stream of new types using different active laser media and technological principles. Most of the individual submarkets for lasers are small in volume. Accordingly, mass production and process innovations are of limited significance in this industry. In contrast, a key challenge for laser producers is to identify useful new applications for lasers and custom-design lasers for these applications. This requires in-depth knowledge of specific customer needs, which is highly application-specific, limiting the advantages of industry incumbents over newcomers. The importance of market knowledge thus opens up opportunities for new entrants into the laser industry based on familiarity with the respective applications. Recent empirical work on both the US and the German laser industries (Buenstorf, 2005; Klepper and Sleeper, 2005; Klepper and Thompson, 2005) has shown that in both countries, the emergence of new submarkets has enabled sustained increases in the number of active firms. New entry was sufficient to compensate for substantial rates of exit and mergers between active producers. No evidence was found that early entrants enjoyed advantages

over later entrants in the laser industry. Accordingly, the opportunities for entrepreneurial entry have not diminished over time in this industry.

The crucial implication of the specialization patterns found in industries such as lasers (but also other industries, e.g., in software) is that the extent and nature of opportunities in an industry do not simply depend on the age of the industry, but on more fundamental technological and economic characteristics. While this limits our ability to generalize across industries, recent work on industry evolution points toward systematic determinants of the alternative evolutionary paths such as the significance of synergies among submarkets.

In addition to identifying regularities and differences in the patterns of industry evolution, recent studies have also investigated the relationship between the background of entrants and their post-entry performance. These studies show that founders with industry experience are on average more successful than entrepreneurs from outside the industry. For the present discussion, it is particularly noteworthy that industry experience appears to enable entrants to identify (or create) and pursue higher-quality opportunities.

Strong evidence from a number of industries suggests that, on average, spin-offs founded by ex-employees of industry incumbents are particularly successful entrants. Industries with highly successful spin-offs include historical cases such as automobiles (Klepper, 2002) and tires (Buenstorf and Klepper, 2005), but also modern high-tech industries such as semiconductors (Moore and Davis, 2004), disk drives (Agarwal et al., 2004), and lasers (Buenstorf, 2005; Klepper and Sleeper, 2005). Not all spin-offs perform equally well, but the top performers are concentrated among the spin-offs of leading incumbent firms. Better incumbents moreover tend to have more spin-offs than other firms. These patterns suggest that spin-off founders learn valuable lessons during their prior employment and are able to transfer their knowledge to the new firm.⁷

It is more difficult to pin down precisely what it is that nascent spin-off founders learn in their jobs, and why it cannot in the same way be

exploited in the existing firm, or in a firm that hires employees from leading incumbents (but is not founded by them). Anecdotal evidence suggests that spin-off formation is often based on the pursuit of an opportunity that the employer does not recognize as valuable, or that is not pursued by the employer because it does not fit into the general strategy and/or threatens to cannibalize existing products. (SAP is a classic case in point; Klepper and Sleeper, 2005, provide a theoretical explanation.) This is also consistent with findings that spin-offs are important in industries (such as lasers) characterized by specialization along submarkets. In terms of the distinction made in section 3, the opportunity leading to the formation of a spin-off may be a “higher-order opportunity” requiring substantial further effort for creating the conditions for successful entrepreneurship. At the same time, the above discussion of subjective business conceptions in entrepreneurial firms suggests a direct link between the perception of entrepreneurial opportunities and their subsequent pursuit. Based on these considerations, it is not surprising that spin-offs can exploit opportunities in ways that non-spin-off firms hiring employees from the industry leaders cannot, as spin-off founders are in a unique position to shape the mission and strategy of their firms.

This account for the superior performance of spin-off entrants is supported by findings on the German laser industry, where a more fine-grained distinction between the backgrounds of entrants could be made (Buenstorf, 2005). In this industry, producers with a background in public research showed the weakest performance of all types of entrants. At the same time, laser importers and distributors that integrated into the manufacturing stage of the industry were no less successful than spin-offs from industry incumbents. These patterns indicate that technological capabilities may not have been decisive for the differences in firm performance, as the academic startups should not have been disadvantaged with regard to these. What seems to have distinguished spin-offs and integrating distributors from the academic startups is their superior knowledge of customer needs and promising new product

variants, suggesting they were superior in their ability to detect and pursue profitable opportunities.

In summary, then, the findings on evolutionary patterns in industries as well as the spin-off process show how entrepreneurial opportunities are affected by the evolution of industries. In combination with firm-level developments, industry evolution creates new opportunities while modifying and often eliminating existing ones. In addition, industry incumbents serve as “training grounds” for potential spin-off entrepreneurs learning both to identify and to pursue opportunities.

6. Conclusions: evolutionary thought as an opportunity for entrepreneurship research

The general theme of this paper has been to link the opportunity concept from entrepreneurship research with evolutionary approaches to markets, organizations, and industries. The adoption of an evolutionary market process perspective has led to the identification of some new aspects of entrepreneurial opportunities as well as their perception and pursuit.

As regards the nature of entrepreneurial opportunities, the present discussion showed that in an evolutionary market process perspective, almost all opportunities are created by human activity. The degree of deliberateness underlying the opportunity creation varies, and the creator of an opportunity may differ from the one who subsequently pursues it. It makes sense, nonetheless, to see opportunities as existing in an objective way, and to strictly distinguish between the objective existence of opportunities and their subjective perception by the individual discovering them. The notion of “higher-order opportunities” was introduced to highlight that even deliberate entrepreneurial opportunity creation departs from exogenously given conditions. At the same time, the way in which an entrepreneur perceives an opportunity not only affects her decision whether and how to pursue it. It also has substantial repercussions on the coordination of activities and the motivation of employees in the entrepreneurial firm, thus shaping the latter’s subsequent development and also – through creating the conditions

for spin-off formation by the firm's employees – further entrepreneurial activities. Finally, the evolutionary perspective helps identify endogenous changes in the nature of entrepreneurial opportunities brought about by industry evolution. While there are marked differences in the evolutionary paths of specific industries, current research is improving our understanding of both the alternative patterns and their implications for the creation of new opportunities.

The empirical evidence on entry in the evolution of industries is complementary to other kinds of empirical material used in entrepreneurship research, which is typically not limited to a narrowly defined industry and thus can hardly account for industry-specific factors. To be sure, when data for broader sectors or entire economies are utilized, dummy variables may be used to control for industry differences. However, caution needs to be applied in interpreting the coefficient estimates of such dummies, as they may reflect either genuine differences between industries or differences in the developmental stages of the industries at the time of investigation. Furthermore, the notion of entry adopted in industry studies differs from the proxies mostly used to measure entrepreneurship. For a firm to be a new entrant into an industry, the firm as such need not be new. In contrast, new firm formation is the dominant proxy of entrepreneurship in most other empirical work, and accordingly the results from the alternative strands of literature are often not directly comparable. However, if entrepreneurship is conceived as the pursuit of opportunities, then entry into a new industry (even by pre-existing firms) seems a valid proxy of entrepreneurship. It may in some uses be an even better proxy than new firm formation.

The concepts and findings of evolutionary economics utilized above clearly have limitations. Theories of firm development and industry evolution are not fully developed, and our knowledge about the determinants of pre-entry experience effects on firm performance is still sketchy. Moreover, we are only beginning to explore the co-evolutionary interaction between changes at the firm level and the evolution of the industry in which a firm is active. Advancing the knowledge about these issues seems relevant for

both evolutionary economics and entrepreneurship research.

This paper has highlighted the potential for deriving useful insights into entrepreneurship based on adopting an evolutionary economics perspective. This is not to suggest that only entrepreneurship scholars can learn from evolutionary economics and not vice versa. For example, detailed case study evidence on the fate of individual entrepreneurial ventures provides a most valuable input for the evolutionary work on firm and industry development. Furthermore, scholars of entrepreneurship have amassed material about the characteristics of new firms and their founders, and their empirical studies underline the important role of new entrepreneurial ventures in the economic development of regions and entire economies. New firms are likewise central to the emergence of many new product markets. The findings of these studies indicate that entrepreneurship and new firm formation are crucial ingredients in any adequate theory of economic development. This is essentially the project that Schumpeter – one of the founding fathers of both evolutionary economics and entrepreneurship research – pursued back in 1911. Present-day evolutionary economists continue to work on the Schumpeterian project. Yet the project has not been fully accomplished, and the more we learn about entrepreneurship, the better the chances that eventually it will be.

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Notes

¹ Contemporary Austrian economists tend not to accept Schumpeter as one of their own, even though his analysis

focused on process and development, and in spite of the strong subjectivist element in his (early) entrepreneurship theory. Schumpeter's position toward socialism seems at least in part responsible for this rejection (cf. Koppl and Minniti, 2003, pp. 86–87).

² This stark economic contrast between Kirznerian and Schumpeterian entrepreneurs is not paralleled by equally pronounced differences between the concrete kinds of the opportunities that they pursue. Some of the specific kinds of “new combinations” discussed by Schumpeter (1911, ch. 2), particularly those based on new markets or new inputs rather than product, process, and organizational innovations, are quite similar to the arbitrage opportunities emphasized by Kirzner.

³ Evolutionary economics is a heterogeneous field. Following the seminal contribution by Nelson and Winter (1982), a substantial fraction of evolutionary economists build their conceptual models on the variation–selection–retention scheme of Darwinian evolutionary biology. Consequently, the application of this scheme is sometimes proposed as the defining characteristic of the evolutionary approach. This position is not unequivocally accepted in the evolutionary economics camp, however (cf. Cordes, 2006; Foster, 1997; Witt, 2003). Following a more inclusive characterization, the crucial feature of evolutionary economics is an emphasis on processes of endogenous development and change rather than equilibria and the adjustment toward them. Witt (2003, p. 13) defines evolution as the “self-transformation over time of a system under consideration,” where self-transformation is specified as the emergence and dissemination of novelty. According to this definition, novelty is the cornerstone of an evolutionary approach to economics.

⁴ Schumpeterian innovation is among the possible causes of changes, but in contrast to Schumpeter's (1911, ch. 2) view of the consumer as passive and easily manipulated, changes may also originate on the demand side.

⁵ Strategy researchers frequently adopt the routine concept from evolutionary economics. In particular, it is congenial to the resource- and capability-based approaches in strategy, where firms are characterized as ongoing, heterogeneous entities whose past activities condition their present competitive position as well as the future developmental trajectories open to them (Peteraf and Barney, 2003). According to this view, the competitive position of the firm is based on its strategic resources and capabilities, i.e. those assets and skills that cannot easily be imitated by competitors. Frequently, the accumulation of strategic resource positions also takes time within the firm, as their rate of adjustment per unit time is limited (Dierickx and Cool, 1989). Organizational routines fit well into this characterization of what firms are and how they develop over time. Given their shared and partially tacit character, routines cannot be developed instantaneously by the firm, and they are difficult to copy for competitors. Organizational routines are thus straightforward as loci of organizational capabilities. In turn, capabilities condition the firm's capacity to discover and pursue opportunities. Thus, at least in the context of entrepreneurial activities by estab-

lished firms [“corporate entrepreneurship” in Burgelman's (1983) sense], the routine concept links evolutionary economics, strategy and entrepreneurship.

⁶ This kind of “opportunistic” entry can for example be found in the historical US tire industry, where it tended to be of little success, however (Buenstorf and Klepper, 2005).

⁷ These considerations primarily apply to what may, in analogy to a similar distinction made in the entrepreneurship literature, be called “opportunity spin-offs”: employee startups based on a perceived opportunity for a successful entrepreneurial venture. Empirically, they are often difficult to distinguish from “necessity spin-offs” for which (mostly adverse) developments in the parent firm such as acquisition, withdrawal from a market etc. provided the impetus.

References

- Agarwal, R., R. Echambadi, A. M. Franco and M. B. Sarkar, 2004, ‘Knowledge Transfer through Inheritance: Spin-out Generation, Development and Survival’, *Academy of Management Journal* **47**, 501–522.
- Buchanan, J. M. and V. J. Vanberg, 1991, ‘The Market as a Creative Process’, *Economics and Philosophy* **7**, 167–186.
- Buenstorf, G., 2003, ‘Designing Clunkers: Demand-side Innovation and the Early History of the Mountain Bike’, in U. Cantner and J. S. Metcalfe (eds.), *Change, Transformation and Development*, Heidelberg: Physica, 53–70.
- Buenstorf, G., 2005, ‘Evolution on the Shoulders of Giants: Entrepreneurship and Firm Survival in the German Laser Industry,’ *Max Planck Institute of Economics: Papers on Economics and Evolution* # 0520.
- Buenstorf, G. and S. Klepper, 2005, ‘Heritage and Agglomeration: The Akron Tire Cluster Revisited,’ *Max Planck Institute of Economics: Papers on Economics and Evolution*, #0508.
- Buenstorf, G. and J. P. Murmann, 2005, ‘Ernst Abbe's Scientific Management: Theoretical Insights from a Nineteenth-century Dynamic Capabilities Approach’, *Industrial and Corporate Change* **14**, 543–578.
- Buenstorf, G. and U. Witt, 2006, ‘How Problems of Organizational Growth in Firms Affect Industry Entry and Exit,’ *Revue de l'Observatoire Francais des Conjonctures Economiques* (June), 47–62.
- Burgelman, R. A., 1983, ‘Corporate Entrepreneurship and Strategic Management: Insights from a Process Study’, *Management Science* **29**, 1349–1364.
- Cordes, C., 2006, ‘Darwinism in Economics: From Analogy To Continuity,’ *Journal of Evolutionary Economics* **16**, 529–541.
- Dierickx, I. and K. Cool, 1989, ‘Asset Stock Accumulation and Sustainability of Competitive Advantage’, *Management Science* **35**, 1504–1511.
- Foster, J., 1997, ‘The Analytical Foundations of Evolutionary Economics: From Biological Analogy to Economic Self-organization’, *Structural Change and Economic Dynamics* **8**, 427–451.
- Hayek, F. A., 1945, ‘The Use of Knowledge in Society’, *American Economic Review* **35**, 519–530.
- Higgins, M., 2005, *Career Imprints: Creating Leaders Across an Industry*, San Francisco: Jossey-Bass.

- Kelly, C., 1979, 'Clunkers among the hills,' *Bicycling* (January), 40–42.
- Kirzner, I. M., 1973, *Competition and Entrepreneurship*, Chicago and London: University of Chicago Press.
- Kirzner, I. M., 1997, 'Entrepreneurial Discovery and the Competitive Market Process: An Austrian Approach', *Journal of Economic Literature* **35**, 60–85.
- Klepper, S., 1996, 'Entry, Exit and Growth, and Innovation Over the Product Life Cycle', *American Economic Review* **86**, 562–583.
- Klepper, S., 1997, 'Industry Life Cycles', *Industrial and Corporate Change* **6**, 145–181.
- Klepper, S., 2002, 'The Capabilities of New Firms and the Evolution of the US Automobile Industry', *Industrial and Corporate Change* **11**, 645–666.
- Klepper, S. and S. B. Sleeper, 2005, 'Entry by Spinoffs', *Management Science* **51**, 1291–1306.
- Klepper, S. and P. Thompson, 2005, 'Submarkets and the Evolution of Market Structure,' Carnegie Mellon University, mimeo.
- Koppl, R. and M. Minniti, 2003, 'Market Processes and Entrepreneurial Studies', in Z. J. Acs and D. B. Audretsch (eds.), *Handbook of Entrepreneurship Research*, Boston: Kluwer, 81–102.
- Mises, L., 1949, *Human Action*, New Haven: Yale University Press.
- Moore, G. and K. Davis, 2004, 'Learning the Silicon Valley Way', in T. Bresnahan and A. Gambardella (eds.), *Building High-Tech Clusters: Silicon Valley and Beyond*, Cambridge, UK: Cambridge University Press, 7–39.
- Nelson, R. R. and S. G. Winter, 1982, *An Evolutionary Theory of Economic Change*, Cambridge, MA, London: Belknap Press of Harvard University Press.
- Peteraf, M. A. and J. B. Barney, 2003, 'Unraveling the Resource-Based Tangle', *Managerial and Decision Economics* **24**, 309–323.
- Sarasvathy, S. D., N. Dew, S. R. Velamuri and S. Venkataraman, 2003, 'Three Views of Entrepreneurial Opportunity', in Z. J. Acs and D. B. Audretsch (eds.), *Handbook of Entrepreneurship Research*, Boston: Kluwer, 141–160.
- Schumpeter, J. A., 1911, *Die Theorie der wirtschaftlichen Entwicklung*, München: Duncker & Humblot.
- Schumpeter, J. A., 1942, *Capitalism, Socialism and Democracy*, New York: Harper & Brothers.
- Shane, S., 2000, 'Prior Knowledge and the Discovery of Entrepreneurial Opportunities', *Organization Science* **11**, 448–469.
- Shane, S., 2003, *A General Theory of Entrepreneurship*, Cheltenham: Edward Elgar.
- Witt, U., 1985, 'Coordination of Individual Economic Activities as an Evolving Process of Self-Organization', *Economie Appliquée* **37**, 569–595.
- Witt, U., 1998, 'Imagination and Leadership – the Neglected Dimension of an Evolutionary Theory of the Firm', *Journal of Economic Behavior and Organization* **35**, 161–177.
- Witt, U., 1999, 'Do Entrepreneurs Need Firms? A Contribution to a Missing Chapter in Austrian Economics', *Review of Austrian Economics* **11**, 99–109.
- Witt, U., 2000, 'Changing Cognitive Frames – Changing Organizational Forms: An Entrepreneurial Theory of Organizational Development', *Industrial and Corporate Change* **9**, 733–755.
- Witt, U., 2002, 'How Evolutionary Is Schumpeter's Theory of Economic Development?', *Industry and Innovation* **9**, 7–22.
- Witt, U. 2003, 'Evolutionary Economics and the Extension of Evolution to the Economy'. In his: *The Evolving Economy. Essays on the Evolutionary Approach to Economics*. Cheltenham, Edward Elgar, pp. 3–34.