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REFLECTIONS ON THE 2010 AMR DECADE AWARD: WHITHER THE PROMISE? MOVING FORWARD WITH ENTREPRENEURSHIP AS A SCIENCE OF THE ARTIFICIAL

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In this article we speak of roads taken and paths yet to be traversed. Over the past decade, entrepreneurship researchers have accumulated considerable work related to opportunities. Here we outline new possibilities opened up by that work and seek to recast entrepreneurship as a science of the artificial in three ways: understanding opportunities as made as well as found, moving beyond new combinations to transformations, and developing a new nexus around actions and interactions.

In “The Promise of Entrepreneurship As a Field of Research” (hereon referred to as “Promise”), Shane and Venkataraman (2000) staked out a distinctive territory for entrepreneurship research centered on the concept of “opportunities” that has since become the focus of considerable scholarship. In the decade following publication of the article, “Promise” has influenced scholars within the fields of entrepreneurship and management, as well as scholars from a variety of other disciplines. Only 46 percent of the published journal articles citing the article are from entrepreneurship and small business-focused journals; the rest have been published either in general management journals (32 percent) or in outlets outside of management (24 percent).¹ “Promise” has been cited in fields as

varied as sociology (Bowman, 2007), law (Abramowicz & Duffy, 2008), and psychology (Hisrich, Langan-Fox, & Grant, 2007), and it has inspired a variety of theoretical and empirical investigations. While some scholars have built on the ideas from the article to offer additional theoretical contributions (e.g., Cardon, Wincent, Singh, & Drnovsek, 2009; McMullen & Shepherd, 2006), others have used a variety of empirical techniques, such as qualitative analysis (Maguire, Hardy, & Lawrence, 2004), conjoint analysis (Haynie, Shepherd, & McMullen, 2009), experiments (Brundin, Patzelt, & Shepherd, 2008), and surveys (Lechner, Dowling, & Welpel, 2006), among others.

Here we aim to outline a few more opportunities for future work that draw on the growing body of work already under way. We begin by extracting a dominant thread in current entrepreneurship research, on which we build a framework for moving forward into the future. The framework draws on Herbert Simon’s (1996) notion of a science of the artificial and outlines three ways we can transform entrepreneurship from a social science to a science of the artificial. We conclude by pointing out the possibility that entrepreneurship research may be at a crucial juncture in the history of ideas, evocative of

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¹ Based on a search of the ISI Web of Science conducted on February 20, 2011. The search returned 548 scholarly works. Of those, 238 were published in journals focusing on entrepreneurship and small business, 178 in the broader category of management (including organizational behavior and strategy), and 132 in journals outside of management.

the development of the scientific method in the seventeenth century.

THE PROMISE TO DATE

Upon perusal of the articles citing "Promise," we noticed a number of developments, including (1) a more nuanced view of entrepreneurs, spanning cognition, intuition, emotion, learning, and expertise (Cardon et al., 2009; Corbett, 2005); (2) an ongoing theoretical conversation on the discovery versus the creation of entrepreneurial opportunities (Chiasson & Saunders, 2005); and (3) the identification of specific mechanisms of entrepreneurial action, such as bricolage (Baker & Nelson, 2005), improvisation (Baker, Miner, & Easley, 2003; Hmieleski & Corbett, 2008), and effectuation (Read, Song, & Smit, 2009; Sarasvathy, 2001), and how these may lead to resilience, identity, new markets, and social change. Below we do not attempt a comprehensive review; instead, we seek to highlight and draw out specific threads that can be woven together to form a new set of possibilities for future research.

What Opportunities Are: A Dominant Thread in Current Research

"Promise" appears to have set in motion several productive exchanges on the ontology and epistemology of opportunities. The immediate comments on the article (Erikson, 2001; Singh, 2001; Zahra & Dess, 2001) launched exchanges that have evolved into sophisticated conversations through the past decade. Gartner, Carter, Hills, Steyaert, and Hjorth (2003), for example, identified contrasting ontological conceptions—one arising out of the positivist/realist position predominant among North American researchers (namely, that opportunities exist in the environment independent of the entrepreneur, waiting to be discovered) and another out of a social constructionist position, more prevalent in the European research tradition (namely, opportunities are enacted, depending upon the entrepreneur's perception, interpretation, and understanding of environmental forces). Dutta and Crossan (2005) brought a related yet different take on the ontological controversy by examining a Schumpeterian versus a Kirznerian view of entrepreneurial opportunities. Furthermore, by applying an organizational learning framework to entrepreneurial opportunities, they explicitly

highlighted the importance of stakeholders to the development of these opportunities.

Sarason, Dean, and Dillard (2006) added another thread to the conversation through structuration—the view that entrepreneurs and social systems coevolve (Giddens, 1984). This view provided a reflexive and emergent ontology for entrepreneurial opportunities. In the spirit of the "nexus of individual and opportunity" in "Promise," these authors argued that "while ventures are reflections of [social] systems, the reflection is altered through the processes of interpretation and influential action" (2006: 301) by individual entrepreneurs. Consistent with this perspective, scholars have further argued that much entrepreneurship is a team and/or community endeavor, rather than an individual one (Gartner, Shaver, Gatewood, & Katz, 1994), thus highlighting the role of collective interaction, negotiation, and shared experience in shaping and reshaping opportunities (Peredo & Chrisman, 2006; West, 2007). This thread of the conversation has further served to focus the field's attention on the deeply social nature and institutional nature of entrepreneurial opportunity, factors that are also very much at the forefront of emerging research on social entrepreneurship (Hill, Kothari, & Shea, 2010).²

Alvarez and Barney simplified the ontological debate by talking about the discovery and creation of opportunities as follows: "Do entrepreneurial opportunities exist, independent of the perceptions of entrepreneurs, just waiting to be discovered? Or, are these opportunities created by the actions of entrepreneurs?" (2007: 11). This, in turn, prompted a rejoinder from Klein, who urged us to adopt the subjectivist view from Cantillon-Knight-Mises: "As such, opportunities are neither *discovered* nor *created* (Alvarez & Barney, 2007), but *imagined*. They exist, in other words, only in the minds of decision makers" (2008: 176). Using a feminist lens, Calás, Smircich, and Bourne added to this conversation the necessity to recognize the role of researchers themselves in producing both the ontologies and the controversies these generate: "These premises are antiontological in that there is no actual ground to justify the stability of knowl-

² We thank an anonymous reviewer for highlighting several points that appear in this paragraph.

edge claims other than the processes of knowledge production themselves" (2009: 563)

In the most recent version of the debate, which has moved from ontology to epistemology, we seem to have come full circle with Wood and McKinley (2010), postulating a constructivist perspective, and Alvarez and Barney (2010), arguing for two kinds of realist perspectives. In the latest *Entrepreneurship Theory and Practice* special issue on the future of entrepreneurship research, Dimov suggests what appears to us an important way forward:

Discussions about opportunities as a central focus of entrepreneurship research are at once conceptually grabbing and empirically elusive. The general notion that there are entrepreneurial opportunities out there—possibilities for profitable introduction of products or services—is very intuitive and hard to disprove; indeed, it is made evident by incessant entrepreneurial successes around us. But in turning toward an empirical investigation of those aspiring to such possibilities, one finds it impossible to reliably distinguish opportunities from nonopportunities. Such a conundrum naturally stifles empirical investigation as the construct of opportunity lacks tangible tenets to guide our observations of aspiring entrepreneurs (2011: 75).

Dimov then urges us to clarify the construct of opportunity "in substantive terms, i.e., in terms of what aspiring entrepreneurs do" (2011: 75)—a strategy we also follow here.

What Entrepreneurs Do: Toward a Science of the Artificial

In Table 1 we present a list of recent studies that have identified particular strategies, techniques, heuristics, and mechanisms used by en-

trepreneurs in building new ventures and new markets. Taken together, these studies emphasize how elements of the internal environment of the organism (the entrepreneur's cognition, emotions, actions, and aspirations) interact with elements of the external environment (be they market structures, institutions or institutional voids, stakeholders, resources, or cofounders). The findings being cumulated in this stream are both practically relevant and pedagogically useful. More important, however, they are evocative of Simon's (1996) description of sciences of the artificial.

It is customary to think of two classes of sciences: natural and social. And it is routine to classify fields such as management and organizational studies under the social sciences. But there are at least two major problems with this classification. First, it creates the illusion that the two categories exhaust all phenomena of interest to scientists. Second, it obscures one of the most fascinating aspects of the phenomena we file away under the rubric of social sciences—namely, the fact that they have to do with what *can* be rather than with what is or what *ought* to be. Simon expressed his insight as follows:

Finally, I thought I began to see in the problem of artificiality an explanation of the difficulty that has been experienced in filling engineering and other professions with empirical and theoretical substance distinct from the substance of their supporting sciences. Engineering, medicine, business, architecture, and painting are concerned not with the necessary but with the contingent—not with how things are but with how they might be—in short, with design (1981: ix).

TABLE 1
Mechanisms in the Making of Entrepreneurial Artifacts

Mechanism(s)	Article(s)
Articulated cognition	Geroski (2003), Bingham, Eisenhardt, & Furr (2007)
Bricolage	Baker & Nelson (2005), Mair & Marti (2009)
Coconstruction/cocreation of markets	Read, Dew, Sarasvathy, Song, & Wiltbank (2009), Santos & Eisenhardt (2009)
Effectuation	Sarasvathy (2001), Read Song, & Smit (2009)
Emotions	Brundin, Patzelt, & Shepherd (2008), Chen, Yao, & Kotha (2009)
Equity negotiations	Hellmann & Wasserman (2010)
Exaptation	Dew, Sarasvathy, & Venkataraman (2004)
Improvisation	Baker, Miner, & Eesley (2003), Hmieleski & Corbett (2006)
Pattern recognition	Baron (2006), Baron & Ensley (2006)
Reassessment of assumptions	Haynie, Shepherd, Mosakowski, & Earley (2010)
Transformation	Sarasvathy & Dew (2005), Dew, Read, Sarasvathy, & Wiltbank (2010)

In short, artificial phenomena embody teleology. That does not mean, however, that we cannot study them scientifically. Nor does it mean that we can afford to ignore the laws of nature and/or relevant theories from the social sciences as they apply to artifacts. Simon's insight was forged through decades of trying to deepen our understanding of organizational and other phenomena that involve motivations, aspirations, and purposes, most of which are often ambiguous yet operate within contexts of multiple uncertainties. Simon's insight not only foreshadowed our recent angst about the prescriptive relevance of our scholarship (McGahan, 2007) but also pointed out the possibility of constructing an entirely new class of sciences where such relevance is stitched into its methods. The challenge he had envisioned—to design worlds and not just to study them—is no doubt massive and daunting, but it is not a problem that entrepreneurship researchers should shy away from.

MOVING FORWARD WITH ENTREPRENEURSHIP AS A SCIENCE OF THE ARTIFICIAL

Let us begin by asking the obvious pragmatic question: What difference does it make whether we study any particular phenomenon as natural, social, or artificial? The difference is not in the phenomenon as such but in whether we take it to be a *given*—needing explanation in terms of consensus-arrived material, formal and efficient causes—or whether we take it to be a *contingency*.

The natural and social sciences are mainly interested in providing causal explanations. These explanations may yield normative prescriptions for controlling the phenomenon, but the lack of such prescriptions will not, in general, be held as a strike against them. In mathematical terms, we're interested in how the key variables relate to each other. Altering those relations is a subsidiary and often minority concern. No theory on the weather, for example, will be rejected on the grounds it doesn't offer any means for controlling the weather. As a theory develops, it splits into two streams: (1) "basic" research that continues to refine the causal explanations and (2) "applied" research that seeks to alter the variables of explanation. At that point the phenomenon of interest has become

an artifact. It has become something to be designed.

The phenomenon of drought, for example, may be seen as both a physical and social construct. Thus, the claim that the lawns of suburban Las Vegas suffer from drought conditions may be studied in terms of models explaining how foreign grass species adapt to different climes. Or the so-called drought may be revealed to be a socially constructed phenomenon in that it assumes human-planted species can be permitted to set the terms for describing a landscape. If we poll the cacti, there may well be a surfeit of rainfall rather than a drought. But if we had the capacity to design grass species for a given clime or to effect rainfall in an environmentally safe way or to create effective systems to recycle waste water, then the drought problem would become an artifact. It would move from something to be studied to something to be designed.

A science of the artificial is interested in phenomena that can be designed. Such an interest assumes that the phenomenon under consideration is a contingent one. It is not a given, with a mostly fixed or essential identity, and separable into external and internal environments. A science of the artificial is interested in a phenomenon's variables precisely to the extent we can intervene and change them. Design lies in the choice of the boundary values; control lies in the means to change them.

The basic outline of what constitutes a science of the artificial owes much to Simon. However, his focus on human artifacts should not be taken to mean that a science of the artificial is so restricted. First, the existence of a designer is sufficient but not necessary for the possibility of design. Second, contingency manipulation is a fundamental ability of all life. For example, contingency generation is of critical importance in the proper realization of developmental pathways (Gerhart & Kirschner, 1997: 45–90). As Lewontin put it:

The first rule of the real relation between organisms and environment is that environments do not exist in the absence of organisms but are constructed by them out of bits and pieces of the external world. The second rule is that the environment of organisms is constantly being remade during the life of those living beings. . . . Third, organisms determine the statistical nature of the environment as far as it has an influence on themselves (1991: 113).

The idea of the distinction between object/environment is also useful because it offers an alternative to the idea that design consists of intervening in the values of a problem's variables. The object/environment distinction highlights the existence of an interface or, to use Simon's preferred term, a *boundary*. The natural and the social are the givens of inner and outer environment. While the organism and its environment both embody and may be explained by the natural and/or social sciences, the artifact—what may be designed—lies on the boundary between them. This shift from a language of variables and values to a language of boundaries is significant, because, as we'll discuss a little later, it marks a shift from a language of things to a language of relationships.

Just as there are several ways to conceptualize design, there are several ways to study design in different domains. To cite just a couple of examples, Gresov and Drazin (1997) contrast contingency theory with equifinality as a way to study organization design, and Pil and Cohen (2006) bring together facilitators of imitation with the drivers of dynamic capabilities in the context of innovation. With regard to studying entrepreneurship as a science of the artificial, we offer three starting points: (1) seeing opportunities as made as well as found, (2) moving beyond new combinations to include transformations as a central concept, and (3) focusing our empirical work on the actions and interactions of entrepreneurs and their stakeholders as an important unit of analysis. We turn now to briefly elaborating on each of these.

Made As Well As Found

The distinctive domain of entrepreneurship consists of the study of opportunities for value creation (Venkataraman, 1997). And opportunities may be of several different kinds—some obvious and easily recognized, others more subtle and not so easily discovered, and yet others nonexistent until people set out to make them from unexpected ingredients (Sarasvathy, Dew, Velamuri, & Venkataraman, 2005). When we seek to model entrepreneurship as a science of the artificial, we can begin to see opportunities as epistemological constructs of the kind tackled by the philosopher Donald Davidson. In Davidson's thesis knowledge is an irreducible tripod consisting of the objective, subjective, and

intersubjective (Davidson, 2001). This tripod is derived from a masterful synthesis of recent findings in a number of areas, including the neurosciences and robotics, where the brain and body are no longer seen as truly apart from physical and social reality (Churchland & Sejnowski, 1992; Jeannerod, 1997). For example, the eyes do not register images like a camera does; instead, perception is a complex process that brings together physical, social, and cognitive elements (Thompson, 1995). Even language is embodied (Lakoff & Johnson, 1999), just as the brain itself can be wired and rewired through nontrivial interactions between the subjective, objective, and intersubjective (Schwartz & Begley, 2002).

Note that in this thesis the vast and disembodied "social" is replaced with the more local and bounded concept of "intersubjective." This serves to refocus social constructionist perspectives in a novel way while at the same time offering a more nuanced and scientifically coherent notion of constructivism. Davidson is concerned not with the myth of the objective but with the more intriguing idea that the mind (or the subjective) itself is constructed out of lived experiences—hence, it is the notion of subjective that is largely a myth. Furthermore, these lived experiences include actual interactions with physical reality as well as with other people. It follows, then, that intersubjective does not equal interpersonal. When we use the term *interpersonal*, we assume two or more people with independent "subjective" viewpoints who exchange and come together through interpersonal interaction. Davidson's notion of intersubjective refers to the fact that our subjective viewpoint already assumes vast areas of coherence with others because we share in and experience the same objective reality. Hence, intersubjective refers to the *ex ante* taken-for-granted shared core between the persons interacting, not to their *ex ante* differences overcome through negotiation. Whether the *ex post* coherence achieved through any particular negotiation eventually becomes part of the intersubjective core in the future depends on selection processes embodied in the lived consequences of such "deals" over time. All knowledge therefore is inextricably intertwined in terms of the subjective, objective, and intersubjective. Whether we study opportunities as made or found, or both, the Davidsonian tripod, with a particular

emphasis on the intersubjective, does bring something unique and useful to deepen our understanding. A classic example might illuminate the point.

Let's start with the easiest case, and the clearest one in terms of a "found" opportunity—finding a \$100 bill on the sidewalk. What makes this an opportunity consists of at least three things:

1. The bill has to exist, and someone has to find it (objective person-opportunity nexus).
2. Someone who comes upon it has to know it is a \$100 bill (subjective interpretation of objective data).
3. Other people have to acknowledge its value—that is, the value of the bill depends on someone else being willing and able to exchange something of value for it based on extant shared understandings of its place in the world (intersubjective basis for a market).

If any one of those three conditions does not hold, the opportunity will not, in fact, be an opportunity. Furthermore, in order for the third condition to hold, the person who found the bill has to pick it up and use the bill in some way and that involves actions and interactions that constitute the atomic units of "making" a market opportunity. Note that intersubjective here refers to something more local and bounded than the entrepreneurs' social networks or environment—the local bounds consisting of the actual shared experiences of those involved. Sociality in this view is filtered through the lived experiences of active agents and is not an amorphous force anonymously impacting their behavior.

Additionally, the notion of intersubjective allows variations into the concept of the social, pluralizing the latter as well as localizing it. The intersubjective, therefore, is particularly relevant to designing artifacts because it shifts the focus to partial orders stitched together into nearly decomposable structures that provide ample possibilities for redesign. It stands to reason that redesigning the "social" is a lot harder to do than redesigning at the level of the intersubjective.

It is interesting to note that the Davidsonian tripod is relevant even if we consider a subjectivist or constructivist opportunity (in contrast to the more obvious realist or discovered example of the \$100 bill on the sidewalk). The relevant example here may be that of J. S. G. Boggs, an

artist who draws near-perfect replicas of U.S. currency. In a book that chronicles his story, Weschler (2000) describes how Boggs paid his restaurant bill of \$87 by offering a choice to the maitre d'—either take a real \$100 bill or take his drawing of a \$100 bill, in both cases requesting the return of \$13 in real dollar bills. While several people faced with this choice preferred real money, as may be expected, over the course of two years Boggs had gathered over \$35,000 through transactions where the other person accepted his drawing instead of real currency.

Most entrepreneurial opportunities are, of course, not so simple as the \$100 bill left on the sidewalk, nor are they as surreal as the case of the Boggs bills. Instead, they are subject to uncertainties along all three legs of the Davidsonian tripod. Under conditions of uncertainty, the actions and interactions that the entrepreneur has to undertake, including the decision to take action at all, increase in complexity and ambiguity. In other words, both processes of making and finding are intertwined in the practical reality of how opportunities come to be. Yet by adding the dimension of the intersubjective to the objective elements of opportunities found in the world and the subjective motivations, behavior, and activities of the entrepreneurs who realize them, we bring to light an important and as yet ignored aspect of empirical reality that opens up fertile pastures for future research in entrepreneurship.

In sum, most entrepreneurial opportunities in the world have to be *made* through the *actions and interactions* of stakeholders in the enterprise, using materials and concepts *found* in the world. Opportunities are, in fact, artifacts. And their making involves *transforming* the extant world into new possibilities. We turn to examining the notion of transformation next.

Beyond New Combinations to Transformations

For the most part, entrepreneurship researchers are intellectual descendants of Schumpeter, who conceptualized entrepreneurial innovations as rooted in the creation of new combinations, a term derived from mathematics and evolutionary biology (Weitzman, 1998). However, there are good reasons for thinking that design processes are not limited to combinatorial manipulations. All combinations may be thought of

as being transformational, of course, but there are transformations that are not combinatorial.

To see this, consider units in a collection being combined that are not random but share certain similarities. If that were not the case, one would merely have a juxtaposition. On the other hand, the units are also dissimilar. In other words, the units' similarities instantiate a common interboundary with an external environment, and their dissimilarities instantiate a collection of intraboundaries. A large corporation with multiple business units is a good example of both the common interboundary with the external environment and the intraboundaries that separate the various divisions. In a combinatorial transformation the relationships between a collection of units may be changed and the new collection may be fundamentally different from the old. However, the new object is related to the old in a distinct way: the interboundary is left untouched. The environment remains the same. In short, it functions as a given and, therefore, can be studied entirely as a phenomenon of the natural or social sciences.

For example, we can model corporate reorganizations as a combinatorial event. People are shuffled around; departments are merged, created, or eliminated; logos are changed; and so on. However, the company continues to compete in the same market environment. Such reorganizations erase the boundaries between the company's units, but they leave the boundary between unit/environment mostly intact. A merger between two organizations, however, often changes the competitive landscape while at the same time reorganizing both entities internally. The latter could be modeled as a transformation that goes beyond recombination.

We can see that when the environment is not taken as a given, the interboundary may not only undergo modification but may also be radically transformed. Here the very essence of what constituted a unit gives way, and there may be no identifiable connection between the new and old entities, except that of history. Evolution is replete with examples of transformations of this sort. A reptile's egg is part of the reptile's environment. The mating of different reptiles may have produced interesting new reptiles, but they produced reptiles. The evolution of reptiles into mammals, however, required a bit of the environment—the egg—to be incorporated into the reptile. The requisite

changes—thermoregulation, fused pelvic plates, and so on—required *plasticity* of form, not combinations of different forms.

Thus, while all combinations are transformational, not all transformations are combinatorial. Both operations may start with the same ingredients but may end up with very different outcomes. Philosophically, transformations deal with meronomic rather than taxonomic relations between parts and wholes (Casati & Varzi, 1999). In mereology an object never exists independent of a given context; it is always *part of* something else. Indeed, it is being *part of* that matters. Relationships, not things, are the items of interest. And interfaces between parts and wholes being the quintessential phenomena of design, meronomic relations and the transformations they enable become core to a science of the artificial.

For our purposes we do not need to fully grasp the logical complexities of mereology. We can simply draw from one of its most lucid proponents, Nelson Goodman, who translated its logic into usable operators in a brief and accessible monograph titled *Ways of Worldmaking* (1978). Goodman outlined five transformation candidates. In an empirical investigation into entrepreneurial expertise, Dew, Read, Sarasvathy, and Wiltbank (2010) extracted eleven transformation types used by expert entrepreneurs in building new ventures, including the five suggested by Goodman. Additionally, biologists Gould and Vrba (1982) kicked off the study of exaptation as an important transformatory process in evolution. Mokyr (1990) and Dew, Sarasvathy, and Venkataraman (2004) chronicled evidence for exaptation in the economics of technological innovations and in entrepreneurship, respectively. So evidence for the existence and use of both combinatorial and transformational strategies and heuristics in what entrepreneurs actually do is beginning to accumulate. As both Goodman (1978) and Gould and Vrba (1982) argued in different ways, both combinatorial and transformational approaches take as their starting points the same concrete reality:

The many stuffs . . . that worlds are made of are made along with the worlds. But made of what? Not from nothing, after all, but *from other worlds*. Worldmaking as we know it always starts from worlds already on hand; the making is a remarking (Goodman, 1978: 6).

In general, while combinations are a simple and useful shorthand for explaining how entrepreneurs create novelty, a deeper look into what entrepreneurs actually do compels us to expand the set of tactical possibilities offered by combinatorics alone. As Brian Loasby (1999) argued, even in the canonical case of "creative destruction" proffered by Schumpeter, historical reality points to more evolutionary transformational processes at work than revolutionary recombinations.

The pluralistic nature of transformation ought to be an important theme for those of us who wish to build on the notion of entrepreneurship as a science of the artificial. Once we move from abstract mathematics into the realm of physical space and time, not to mention social space and history, it is easy to see that there are other processes with significant promise for enriching our future research agendas. Additionally, an important assumption underlying these (and other yet-to-be-discovered) processes of transformation is that of the freedom to choose one's ends as well as one's courses of action—a core element of any science of the artificial. This freedom, however, is not arbitrary or unconstrained: "While readiness to recognize alternative worlds may be liberating, and suggestive of new avenues of exploration, a willingness to welcome all worlds builds none. . . . A broad mind is no substitute for hard work" (Goodman, 1978: 21).

The hard work involves forging commitments from within the intersubjective space to specific courses of action that provide the sufficient condition for transforming. This brings us to the hypothesis that enduring entrepreneurial stories will provide room for stakeholders to engage in cooperative as well as competitive interactions leading to new intersubjective understandings. These redesigns of the intersubjective space then lead to new opportunities that, in turn, transform the venture's business model and the market structures that make it work well. Moreover, both commitments and the changes they require and enable would be empirically observable and verifiable through event histories as well as process theories (Poole, Van de Ven, Dooley, & Holmes, 2000). In other words, tracing and measuring entrepreneurial transformations could be a viable line of empirical research, where the unit of analysis would consist of the actions and interactions of

entrepreneurs and their stakeholders. In fact, these provide the possibility of a new nexus for the field of entrepreneurship research in the near future.

A New Nexus: Action and Interaction

"Promise" emphasized the importance of the nexus between individual and opportunity. As the empirical findings inspired by that nexus have accumulated, we can now see the importance of looking deeper within simple and direct relationships (signified by arrows in our models) between individual and opportunity (inner and outer environment) to find patterns of actions and interactions (signified by boxes that contain mechanisms and processes such as those listed in Table 1). Let us start with an example of the individual-opportunity nexus. In an empirical examination of individuals transitioning from unemployment to self-employment, Dencker, Gruber, and Shah "considered interactions between a founder's human capital characteristics and one key opportunity characteristic that seemed to be the most relevant in the context of our research: the sector-specific labor requirements of a newly founded firm" (2009: 1126). And they found differential impacts on outcomes when looking at individual characteristics alone as opposed to looking at the interactions between the individual characteristic and the opportunity characteristic. In particular,

founders possessing a greater breadth of knowledge create *fewer* jobs, and founders possessing prior leadership experience create *more* jobs. Moreover, as the sector-specific labor requirements of a business opportunity increase, both breadth of knowledge and leadership experience allow founders to run their firms with fewer employees (2009: 1141).

If we added to this finding the notion of a nexus between action and interaction, we would begin to collect data on a more fine-grained level of analysis in order to model particular strategies within the individual-opportunity nexus that are more or less likely to lead to job creation. And if our aim was to create more jobs or manage with fewer employees, we could teach these strategies to the unemployed in designing their transition to self-employment. The unit of analysis for our research, therefore, would include not only demographic variables pertaining to individuals and structural vari-

ables relevant to preconceived opportunities but also specific deals between entrepreneurs and their stakeholders that could lead to the making as well as finding of new opportunities.

For an example of the action-interaction nexus, consider the deal between Richard Branson and Boeing, where Branson got Boeing to lease him a used airplane for a year. If Virgin Airlines did not take off (in a financial sense), he wanted the option of returning the plane so his investment/loss would be affordable. And it could well be that if Boeing had not agreed to the deal, Branson may not have founded Virgin Atlantic. Contingency is explicit and inescapable in deal making at the action-interaction nexus.

Consider a similar example in the case of a more mundane venture. Ruth Owades, founder of specialty catalogs such as Callyx and Corolla, used a loophole in the law to convince the U.S. Postal Service to waive the big fee charged for patrons to collect their own bulk mail earlier in the day. Through a variety of such deals with many different stakeholders, Owades took her original estimated investment of around \$250,000 down to less than \$30,000, which was well within her affordable loss level. Examples of such deal making abound in the start-up histories of every kind of entrepreneurial venture. Each of these made it more viable for the entrepreneurs involved to start the venture and create new jobs, even though the investment up front might easily have deterred them had they not used the particular deal-making tactics they used.

One important implication of models of the artificial involving human beings is that they put human purposes at front and center of the design process. In turn, this puts normative issues within the purview of our work. For example, we can now illuminate how and by whom opportunities are made and found, but it also becomes imperative for us to examine issues such as *for whom* opportunities are made as well as *for whom they are not* (Baker, Gedajlovic, & Lubatkin, 2005). Take the case of the Internet dating site eHarmony and the suit filed against it by Eric McKinley, which led to the company's accepting personal ads from gay people. Or that of Gene's TV, a preferred retailer supplying television and stereo equipment to wealthy gay people in the Los Angeles area. The company prospered after its founder, Gene

Kettredge, successfully pressured Pacific Bell in the late 1970s to force the Yellow Pages to accept ads for gay businesses. Through examples such as these, the issue of opportunity creation in the face of strong and value-laden resistance bubbles up as an important but underresearched topic in entrepreneurship.³

Similarly, an explicit focus on actions and interactions also raises the specter of destruction of opportunities for some, even as new opportunities may become possible for others. For example, some U.S. policymakers argue that the introduction of private charter schools by educational entrepreneurs is destroying the public school system and therefore damaging the families it caters to. Issues such as these have in the past been outside the scope of entrepreneurship research. By shining a spotlight on the actual actions of entrepreneurs and their interactions with the physical and social environment in the process of designing new ventures and new market structures, we open up a research agenda that can tackle issues that span micro and macro levels of analysis.

Another aspect central to the new nexus of action and interaction between entrepreneur and environment consists of the contingent nature of hitherto taken-for-granted stable relationships, such as those between resources and their value, risk, and venture creation and even demand and expected return. For example, scholars have already begun debating the role of entrepreneurship in generating resource value (Foss, Foss, Klein, & Klein, 2007). Technology studies make a similar point—what seems like failure and waste at one point in a technology's development may become the basis for creation and value later on (Cattani, 2006; Garud, Nayyar, & Shapira, 1997). Whether and how valuable any particular resource becomes is contingent upon how people use it—the actions they take can transform waste into value and can couple/decouple complementary assets in ways that make some resources precious while making others redundant (Baker & Nelson, 2005). Therefore, questions such as “When is a resource not a resource?” and “What are the key elements and processes of transformation that

³ We thank our anonymous reviewers for the Gene Kettredge example and several other substantial comments that improved the manuscript.

help make existing resources more valuable?" become of interest.

There has been an implicit assumption in most of entrepreneurship research that the decision to become an entrepreneur (also called the "plunge decision") is an inherently risky one. The plunge decision is most usually modeled as a choice between stable employment with predictable income and a leap of faith with uncertain returns (Woodward & Hall, 2010). Hence, entrepreneurs are seen as risk takers who ignore opportunity costs or hubristic optimists who overestimate the upside potential of the ventures they seek to build. But recent empirical work has shown that techniques such as bricolage (Baker & Nelson, 2005) and affordable loss (Dew, 2009) allow entrepreneurs to reduce the risk simply by working with what they already have and investing no more than they can afford to lose. The deals made by Branson and Owades, mentioned earlier, both exemplify the affordable loss principle. Again, a focus on how entrepreneurs act and interact with their endowments and environments moves our scholarship from models of decision making under uncertainty toward problems of designing within constraints.

Perhaps the most provocative possibility for future work is offered by the notion of designing demand itself. In environments of increasing disposable income and an explosion of technological capabilities, market necessities and gaps or errors in equilibrating forces become less important than the sheer temptation of the possible. For example, take new ventures in the experience economy. Whether it is a hotel made entirely out of ice (a new version every winter as the old one melts away in the summer); a restaurant run by the blind and visually impaired, where customers dine in complete darkness; or the Fojol brothers of Merlindia, who tweet the changing locations of their traveling culinary circus every day to serve Indian food to residents in different parts of Washington, D.C., each of these provides a novel and counterintuitive yet plausible hypothesis: *the only reason these ventures exist is that the founders and their stakeholders set out to do what they do.* And the reason they do it is because they can.

We can claim *ex post* that they fulfill a need, but we would be manufacturing the *ex ante* rationality just as the phenomena we are studying have been. Here markets themselves are products of design. They are artifacts *ensuing* from

the actions and interactions of the entrepreneurs and their stakeholders. They are not antecedents *driving* those actions and interactions. Most extant research under the rubric of entrepreneurship as a social science assumes rationality to be independent and prior to action. In a science of the artificial, this assumption is not taken for granted. Instead, when modeled at the nexus of actions and interactions, both markets and market opportunities can be artifacts.

Promise for the Future: Entrepreneurship As Method

Artifacts resulting from entrepreneurial actions and interactions embody knowledge combined with use in ways that transform the extant world into new opportunities. These opportunities allow us not only to fashion new ways to achieve old ends but also to fabricate new ends. Today's effects, as Simon pointed out, set the constraints and provide the means for tomorrow's purposes. So what have today's effects, ensuing from the decade following publication of the "Promise" article, set up for us as possibilities in the next decade?

Taking stock of all the tools and techniques of entrepreneurial making identified by studies since the "Promise" article was published, along with the new possibilities they currently proffer, has led us to a rather intriguing new line of thinking about the future of entrepreneurship research—namely, that what is emerging in our scholarship may be astonishingly analogous to the history of the scientific method (Sarvasvathy & Venkataraman, 2011). The scientific method allowed philosophers to move away from scholastics, from explanations based on the genius and leisure of a few and from attributing advancements in our understanding of nature to ad hoc coincidences. Similarly, the notion of an entrepreneurial *method* might help us move away from an overreliance on heroic individuals or faceless social, economic, and technological forces in our explanations of entrepreneurship. It might turn us instead toward a more systematic elicitation of helpful heuristics, techniques, strategies, and principles that enable us to achieve human ends and even formulate newer and worthier purposes. In short, in the next decade we may be on the brink of not only understanding but actually helping the design

of new opportunities fashioned through the application of an entrepreneurial method. Recasting opportunities as artifacts and moving forward with entrepreneurship as a science of the artificial, we hope, may renew the "Promise" article for the decade to come.

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