



EFFECTUATION

Elements of Entrepreneurial Expertise

SARAS D. SARASVATHY

New Horizons in Entrepreneurship

Effectuation

NEW HORIZONS IN ENTREPRENEURSHIP

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NEW HORIZONS IN ENTREPRENEURSHIP

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*To my brother Gopal (Narayanan Doraswamy),
without whose help I could not have set out on this journey*

and

*To the memory of Herb Simon,
whose conversation kept me going*

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Foreword

This is a book bursting with insights about the creative process in general and entrepreneurship in particular. Almost all of what is taught in entrepreneurship programs is the ‘cookbook’ of how to find financing, watch cash flow and so on to get a small business started. There has been little research and what there has been tells us little about the central questions: how can the USA and other nations promote entrepreneurship? How can a large company find and promote entrepreneurs within its ranks rather than buying new, promising companies? How do we transform promising research into successful new companies? What education and training can help prospective entrepreneurs?

My background is economics, with assumptions about fixed known preferences, fixed known technologies and rational search. The tools are powerful in finding optima, but almost completely irrelevant in understanding why people become entrepreneurs, which product or service they choose to produce, how they get started, process feedback and organize their efforts and those of others. Some researchers have tried to find the personality traits that distinguish entrepreneurs, but have had little success in answering the important questions.

Dr Sarasvathy takes a *process* approach to entrepreneurship. She describes past approaches to studying entrepreneurial activity and their limitations. She presents her ideas with a plethora of examples of successful entrepreneurial activity. Along the way, she gently punctures the basic assumptions of economics and other disciplines, e.g. that people have fixed utility (preference) functions and engage in rational search. She tells us that entrepreneurs, and others who create, face three types of uncertainty: (1) Knightian uncertainty (the probability distributions and even outcomes are unknown, making it impossible to calculate probabilities or expected consequences); (2) goal ambiguity (preferences are neither given nor well ordered); and (3) isotropy (it is not clear which elements of the environment to pay attention to and which to ignore). Someone thinking about creating the first overnight package delivery service or a restaurant with a new type of food faces these three types of uncertainty. She has insufficient data and information to know the number of likely customers or their willingness to pay for the service. The innovator doesn’t know what customers are looking for or what they would be willing to pay; she probably doesn’t even know her own preferences, apart

from wanting the business to succeed. Asking prospective customers what they would like is about as useful as looking through their garbage cans to see what they didn't eat. People have very different conceptions and desires. What is important? Which ideas are most likely to lead to a successful business?

In taking verbal protocols while asking successful entrepreneurs to work through making a proposed business idea a success, Dr Sarasvathy discovered that all were 'effectuators' who limited their search and analysis in taking one step at a time. She distinguishes this approach from an analytic, maximizing approach:

Causal problems are problems of decision; effectual problems are problems of design. Causal logics help us choose; effectual logics help us construct. Causal strategies are useful when the future is predictable, goals are clear, and the environment is independent of our actions; effectual strategies are useful when the future is unpredictable, goals are unclear and the environment is driven by human action. The causal actor begins with an effect he wants to create and asks, 'What should I do to achieve this particular effect?' The effectuator begins with her means and asks, 'What can I do with these means?' And then again, 'What else can I do with them?'

I found each chapter, almost every page, gave me insights about the creative process. Dr Sarasvathy presents these ideas better than I possibly can, and so I urge the reader to get started on discovering the innovative way that she characterizes the entrepreneurial function.

Before relinquishing my keyboard, I insert a personal note. The research for this book was begun when Dr Sarasvathy was a graduate student at Carnegie Mellon. Even before this, she proved a person of formidable energy and drive, the precise archetype of an entrepreneur. She convinced Herbert Simon, various administrative officials, and me that we should advise her and set up a special interdisciplinary program to meet her career and research needs. Her vision was so clear and her arguments so persuasive that, as happens for a successful entrepreneur, the world opened to her.

Herbert Simon described her ideas as excellent. I was bowled over by her originality and insights.

Were he still alive, Herbert Simon would be writing this foreword. He had a high regard for Professor Sarasvathy, a judgment not to be taken lightly. I cannot offer his clarity of vision, but I can commend this book to you and tell you that you will gain many insights within these pages.

Lester Lave

*Harry B. and James H. Higgins Professor of Economics and
University Professor, Carnegie Mellon University, Pittsburgh PA
4 November 2006*

Preface

Every now and then one comes upon a genuinely new idea. Professor Saras Sarasvathy's idea of effectuation is one such. *Effectuation* is a refreshingly new look at the old phenomenon of entrepreneurship. Indeed, it is a wholly new way of looking at the world around us. After reading this book, you will never look at the world of entrepreneurship the same way again. Sarasvathy's work is based on a beautiful narrative, profound theory, a deep and visceral understanding of the entrepreneurship phenomenon, and everyday facts and events; and it is eminently practical – virtues that are bound to make it a classic in a short period.

Core to effectuation is the idea that rather than discover and exploit opportunities that pre-exist in the world, the effectual entrepreneur is one who 'fabricates' opportunities from the mundane realities of her life and value systems. In the evocative phrase of Sarasvathy, entrepreneurs fabricate opportunities by starting with *who they are, what they know, and whom they know* – in short, all someone needs to create an entrepreneurial legacy in this world is to begin with their intellectual capital, human capital and social capital. At once liberating and practical, this simple idea forms the foundation for a beautiful theory of the 'made' world rather than the 'found' world that populates much of the textbooks and journal pages of the entrepreneurship literature. Significantly, she does not sell entrepreneurship short by interpreting it as a prosaic activity of starting a new business venture for a commercial activity. Rather, she breathtakingly announces that since *all* markets are ultimately markets in human hope, and since all economic value ultimately derives from human beings, any activity that involves the design and creation of products, services, institutions and other human artifacts that addresses this human hope and value falls within the sphere of effectual entrepreneurship.

Central to Sarasvathy's effectuation are two building blocks: the science of the artificial (which, in the context of entrepreneurship, she relabels science of the *artifactual*) and *pragmatism*. As she suggests, the study of entrepreneurship as an artifactual science allows us to ask design-oriented questions rather than 'why' questions or 'explain (immutable) dependence relationships' that are so characteristic of the natural sciences and even many social sciences that aim to mimic natural sciences. Thus our focus shifts from asking, 'why do some people become entrepreneurs?' to 'what

are the barriers to entrepreneurship?’ Similarly, the question that most MBA entrepreneurship programs focus on, namely, ‘How do I become a successful entrepreneur?’ is replaced in the effectual world by ‘Given who I am, what I know, and whom I know, what kind of entrepreneur could I become; what kind of entrepreneurial activities could I pursue; and what kind of enterprises could I create?’ Designing and principles of design and designing then become integral to entrepreneurship.

The second building block in effectuation is the pragmatist method. As Sarasvathy notes, the pragmatist approach allows one to develop design principles for fabricating human artifacts through the entrepreneurial process. What is a firm (or for that matter a market) if not a human artifact? By emphasizing the practical and instrumental courses of action in any situation, rather than seeking a general theory, or some notion of context-free ‘true’ statements, Sarasvathy provides effectuation with a useful and powerful methodology to talk about design and designing the artifactual. As she most eloquently states, ‘whether the all-important idea is “God” or “gravity” or “market” the pragmatist is not chasing the holy grail or even *a* holy grail. Instead, she seeks to make grails, mend them, remake them into urns or other useful artifacts’.

This book is intellectually breathtaking – for its audacity and bold theorizing, for the literary quality of its narrative, for the poignancy of its examples and cases, and for the implications for everyday life – from the prosaic to the profound. Indeed, the chapter on ‘Markets in human hope’ (Chapter 10) alone is worth the price of the book – for all of the above qualities listed. After reading the book one will admit ‘effectuation matters’. Surprisingly, it will be for reasons that one had not thought of before. To very slightly paraphrase Sarasvathy, it matters because how we think about the world influences how we frame problems, what alternatives we perceive and generate; which constraints we accept, reject, and/or manipulate and how; and why we heed certain criteria rather than others in fabricating and implementing new solutions. Thanks to Sarasvathy’s new framing, I see a new dawn for the field of entrepreneurship and beyond.

It is a privilege to write the preface to this last book under my editorship of this series on *New Horizons in Entrepreneurship*. I cannot think of a better way to sign off.

Sankaran Venkataraman
Former Series Editor

Acknowledgments

This book has been a long time in the making. A great many friends, scholars, editors, entrepreneurs, students, relatives and institutions helped make this book happen. They gave freely of their time, expertise, wisdom and friendship. In addition, I must ask for their forbearance in not listing them all by name. A partial list necessarily includes:

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- My collaborators – Nick Dew, Anil Menon, Stuart Read, (Venkat) Venkataraman and Rob Wiltbank – for egging me on.
- Early readers of this book – Jay Barney, Bob Baum, Bob Bruner, Ed Freeman, Brent Goldfarb, David Kirsch, Brian Loasby and Andy Wicks – for their patience and candid comments.
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- Jim March and Jack Roseman for enjoyable and valuable conversations – the former for inspiring ideas about decision-making and model building, and the latter for embodying the logic presented in this book even as he argues with me against it.

I am also indebted to Amy Lemley, Elizabeth O'Halloran, Debbie Wear, Tommar Wilson and Richard Young for their diligent help in coding, transcriptions, copyright clearances and numerous other details. And I would

especially like to thank Amy Halliday for her painstaking efforts at copy-editing.

Finally, I thank each of the 52 entrepreneurs who participated in the study at various stages, for their openness and enthusiasm toward the research process.

Introduction

In a provocative article in the *American Economic Review* titled ‘The age of Schumpeter’ the noted German economist, Herbert Giersch, specified 10 basic postulates for a post-Schumpeterian paradigm. The first of these was:

The approach is micro rather than macro, socioeconomic (if not socio-ecological) rather than mechanistic. In the spirit of Schumpeter’s ‘methodological individualism’ it concentrates on processes rather than outcomes, on voluntarism rather than determinism. Being addressed to current world economic development, it stresses relevance rather than rigor, movement rather than static optimality. (Giersch, 1984: 105)

This book embodies the spirit of this postulate. The theoretical development presented here seeks to provide valid microfoundations for an economics in which Schumpeterian perspectives on innovation, competition and growth are integral, yet consistent with recent evidence from evolutionary economics on the dynamics of markets and industries as well as with recent developments in behavioral economics on human decision-making. The empirical evidence for the microfoundations comes from a cognitive science based study of entrepreneurial expertise using think-aloud verbal protocols. The evidence points to an alternative logic of decision-making under uncertainty that not only embodies the spirit of the postulate stated above but also clearly contrasts with mainstream models based on a causal logic.

Causal logic provides useful decision criteria to achieve given goals subject to environmental selection in the face of an uncertain future. Effectual logic provides useful design principles for transforming extant environments into new futures in the face of ambiguous goals. An entirely causal presentation of an effectual logic would be absurd. Hence I present empirical evidence as part of an ongoing story of research; and I use real-life examples as illustrations of what *could be* rather than as claims to truth about what *actually is*.

The book is divided into four parts:

- The first part tells the story of my empirical work in developing a baseline model of entrepreneurial expertise, which I have dubbed *effectuation* – to signify the inverse of causation.

- The second fleshes out the empirically derived skeleton into a complete theoretical logic and develops predictive relationships between its principles and entrepreneurial performance.
- The third part examines what an effectual logic implies for selected issues relevant to the economics of business and entrepreneurship – particularly:
 - Herbert Simon’s ideas in *Sciences of the Artificial*
 - Current debates in strategic management and entrepreneurship
 - Milton Friedman’s famous essay on positive economics
 - Entrepreneurship outside the for-profit sector
 Each of these implications is meant to spur readers to consider how the ideas laid out in the first two parts could be used. I have unashamedly made speculative leaps, trusting that future work will fill in the gaps.
- The fourth and final part of the book outlines applications to practice, pedagogy and policy, and explores possibilities for future research. Included in this part are three important pieces by others who are developing their own research agendas based on the ideas in the book.

CHAPTER SUMMARIES

Chapter 1 What I Set Out to Study and Why

Chapter 1 is an outline of the study – from motivation to results. Here I lay out key research issues of interest to any scholar of entrepreneurship and explain why and how the expertise perspective from cognitive science would be useful. In a nutshell, I created a 17-page problem set of 10 typical decisions in a startup firm and had a reasonably representative sample of 27 expert entrepreneurs think aloud continuously as they solved the problems. The think-aloud protocols were collected on tape and the transcriptions of the tape formed the primary data for the study. I end the chapter with a summary of major findings.

Chapter 2 What I Found and How

Here I describe the research design in detail and develop the central hypothesis to be tested through quantitative analysis of the data I collected. I also describe how I analysed the data and then move on to qualitative analyses of the contents of the think-aloud protocols. Then I outline the elements of entrepreneurial expertise directly induced from the data. These comprise the bare bones of the effectual logic to be fleshed out in later chapters.

Chapter 3 Interpreting What I Found

In this chapter, I describe how I began interpreting the induced elements and their implications for further work. I also describe a key transition that occurred in my own understanding at this point. This had to do with doubts about a purely positivist research agenda and the lure of a more pragmatist approach. From this point on, the book begins to develop effectuation as a *logic* of entrepreneurial action that has both theoretical and methodological implications for entrepreneurship research, rather than as a *theory* to be pitted against extant theories. This does not mean, however, that I am indifferent to ongoing work to test the empirical validity of ideas in the book. In fact, I outline a number of completed and ongoing studies that are engaged in exactly that enterprise. But the rest of *this* book is devoted to digging into the details of an effectual logic and carefully connecting them with a variety of key issues of import to those interested in entrepreneurship.

Chapter 4 Understanding Effectuation – Problem Space and Solution Principles

Here I describe the static aspects of an effectual logic and clarify each in detail. In particular, I delve into the three dimensions of the problem space in which it makes sense to employ an effectual logic and work out in depth each of the five solution principles of effectuation.

Chapter 5 Understanding Effectuation – Dynamics of the Effectual Process

Chapter 5 contains the core of an effectual logic. Here I trace out in detail how the principles of effectuation can be used in a dynamic and interactive process that creates new markets. In particular, I argue that new-market creation is not always a search and selection process in some theoretical space of all possible markets; instead, it is more likely a transformation of extant realities into new possibilities. In analysing the dynamics of an effectual logic, I confront a powerful tension at the heart of our ideas about how new markets come to be; inside that tension lies a deeper tension identified by the pragmatist philosopher Nelson Goodman. Some readers might find the philosophical baggage rather cumbersome; I hasten to affirm that you do not have to ‘buy’ that baggage in order to grapple with the core ideas here.

Chapter 6 Relating Effectuation to Performance

We return to empirical matters in this chapter, where I work out testable predictions from effectuation with regard to entrepreneurial performance.

The key insight encapsulated in the predictions is the separation of firm performance from the performance of the entrepreneur. Driven by that insight, I trace performance implications of an effectual logic over the life cycles of firms as well as over the careers of entrepreneurs. This allows me to tackle the idea that firm failures can be vital inputs in entrepreneurial success – an idea that overturns the conventional wisdom about the explanatory power of human capital in firm performance.

Chapters 7 through 10 are clearly not everyone's cup of tea – and I invite you to skip the ones that may be too far from your interests.

Chapter 7 Entrepreneurship as a Science of the Artificial

In this chapter, I explore connections between effectuation and the ideas laid out by Herbert Simon in his book *Sciences of the Artificial*, where, with characteristic flair, Simon introduced a new class of sciences. The sciences of the artificial differ both from natural and social sciences, because they incorporate *design* – the intentions and purposes of an intelligent designer. I propose in this chapter that entrepreneurship be studied as a science of the artificial and focus especially on Simon's elucidation of *near-decomposability* as a ubiquitous feature of the architecture of complexity. This is the only chapter that has a touch of formal analysis.

Chapter 8 Competitive Advantages and Entrepreneurial Opportunities

In Chapter 8, I connect ideas from effectuation to current debates in strategic management and entrepreneurship. Sustainable competitive advantage has for a long time been the holy grail of strategic management; and opportunities have become a recent obsession in entrepreneurship. An effectual logic has relevant contributions to both – and I explore them in this chapter. Effectuation emphasizes the role of exit as a strategic tool. This is not a well-studied area and merits further attention, particularly given the substantial role of entrepreneurship both as cause and effect of strategic exit for individuals as well as for firms. Similarly, effectuation also highlights a key underresearched problem in entrepreneurship – namely, the origin of opportunities. Current theories appear to assume that opportunities exist and that the entrepreneurial function consists in their discovery. But the ideas in this book suggest that opportunities themselves originate through the effectual process. This sets up a curious puzzle as to when and under what circumstances we need to take opportunities as given.

Chapter 9 Philosophy and Methodology of Effectual Economics

This is a rather ambitious chapter that attempts the first steps toward building an effectual economics. I tentatively think through the philosophical basis for such an enterprise and briefly sketch an overall methodology. In this I take my cues from Milton Friedman's famous essay on the methodology of positive economics. I strive to keep the argument very close to his and point out several exciting possibilities (most of them far from being completely worked out) for a new branch of economics that could be built on the microfoundations of an effectual logic.

Chapter 10 Markets in Human Hope

This chapter is very close to my heart and comes from my puzzling over the reasons (or rather the lack of *economic* reasons) for distinguishing for-profit ventures from other types of ventures. Entrepreneurs build all types of ventures – for-profit, non-profit, social and hybrid. And an effectual logic is useful in all these varieties of ventures. Yet there is an artificial divide in how they can fund these enterprises and what regulatory provisions they need to contend with in building them. This chapter is a call to arms to overcome this superfluous separation so that individuals and societies can make better use of the entrepreneurial method in unleashing human potential to generate and attain novelty in ends as well as means.

Chapter 11 Teaching Effectuation

Here I share my experiences teaching effectuation. To the best of my knowledge, at least 15 business schools have incorporated effectuation to some degree in their entrepreneurship curricula. But clearly there is more work to be done, and I examine the potential for developing a full-fledged course on effectual logic.

Chapter 12 Research Works-in-Progress

This chapter is written by three of my collaborators, Nicholas Dew, Stuart Read and Robert Wiltbank. They report in their own words how they are extending the ideas related to effectuation. Dew explores effectuation in the context of the evolution of new technologies and new industries through an in-depth account of the Radio Frequency Identity (RFID) industry. Read presents a meta-analysis of extant empirical work in entrepreneurship to find out what we already know about the relationship of an effectual logic to new-venture performance. Wiltbank shows the impact of using

strategies of non-predictive control on the performance of angel investors. All three of these individuals have contributed in numerous ways to this book as a whole – and it is my honor and privilege to have them speak about their work in their own words.

Chapter 13 New Research Ventures

The last chapter looks back at the book to identify things I have not done or not done well so far. It lists empirical questions yet to be investigated, identifies major unresolved tensions in ongoing research, and outlines possibilities for future work.

PART I

The empirical journey – entrepreneurial
expertise

1. What I set out to study and why

This book is a reconstruction of my journey to understand entrepreneurship as a form of expertise. The day I officially began writing this book – 21 June 2004 – was, quite by chance, the day SpaceShipOne made history as the first successful, privately funded, manned commercial space flight. On that day, under the command of test pilot Mike Melvill, SpaceShipOne reached a record-breaking altitude of 328 491 feet (approximately 62 miles or 100 km), making Melvill the first civilian to fly a spaceship out of the atmosphere and the first private pilot to earn astronaut wings. SpaceShipOne embodies many of the elements I want to write about.

The story of SpaceShipOne¹ is tied up with the story of its designer, Burt Rutan. Rutan built his first flying model at age 10. His father was a dentist who teamed up with four other pilots to buy his own plane, and his brother, Dick Rutan was a decorated Air Force pilot who served in Vietnam.

Rutan earned a degree in aeronautics from California Polytechnic University in 1965, joined the Air Force testing new airplanes, and in 1972 became director of Bede Aircraft's test center in Kansas. In 1974, he moved his family into the Mojave desert and went into business for himself. His first venture, Rutan Aircraft Factory, developed light aircraft and served the home-built plane market by developing and selling planes. He formed Scaled Composites in 1982 to develop proof-of-concept prototype aircraft for a variety of customers including Boeing and the Department of Defense. Rutan has over 48 original designs in his portfolio. For example, he designed the Voyager aircraft that flew around the world without refueling in 1986.

In August 2002, the White Knight, a spaceship carrier plane designed by Burt Rutan, took to the air. After that, a series of 56 step-by-step flights was undertaken, culminating in the historic moment on 21 June 2004. And in October 2004, SpaceShipOne won the Ansari X-prize. The terms of the international competition for the X-prize included launching three passengers into sub-orbital space in a reusable aircraft twice within a 14-day period.

Rutan's comrade in arms on this venture was Paul Allen, co-founder of Microsoft, who came on board the enterprise as early as March 2001. Since the founding of Microsoft in 1975, Allen had been involved in its research and new product development until 1983. After that he became both investor and philanthropist in a variety of science- and space-related

projects – a strong proponent of private non-governmental funding for space programs. For example, he funded the construction of the first and second phases of a unique, multiple use radio telescope array for SETI. The SETI Institute is a leading astrobiology institution with the mission of exploring the origin, nature and prevalence of life in the universe. As part of its duties, the telescope array he funded searches for possible signals from technologically advanced civilizations elsewhere in the galaxy.

Three months after the historic flight on 21 June, Sir Richard Branson, founder of Virgin Group, announced an agreement with Mojave Aerospace Ventures (MAV) to develop the world's first privately funded spaceships that will carry commercial passengers on space flights. MAV is Paul Allen's company that owns the technology embodied in SpaceShipOne, which in turn was designed by Burt Rutan and built by his company, Scaled Composites. Branson has formed a new company called Virgin Galactic with a view to kick-starting the space tourism industry by 2007. Virgin Galactic's business plan calls for 3000 astronauts and a ticket price under \$200 000 (including three training days) per passenger.

Commenting on the announcement, Virgin Galactic Founder Sir Richard Branson (2005) said:

We've always had a dream of developing a space tourism business and Paul Allen's vision, combined with Burt Rutan's technological brilliance, have brought that dream a step closer to reality. The deals with both their companies, being announced today, are just the start of what we believe will be a new era in the history of mankind, making the affordable exploration of space by human beings real. We hope to create thousands of astronauts over the next few years and bring alive their dream of seeing the majestic beauty of our planet from above, the stars in all their glory and the amazing sensation of weightlessness. The development will also allow every country in the world to have their own astronauts rather than the privileged few.

The entire story is almost too paradigmatic of the entrepreneurial spirit. The characters are larger than life, straight out of a Horatio Alger myth. Burt Rutan, the brilliant designer of the craft; Michael Melvill and Brian Binnie, the dare-devil pilots; Paul Allen, billionaire sponsor of the enterprise; and of course, the swashbuckling Sir Richard Branson.

On the one hand, it is easy to make shining exemplars of such stories. On the other hand, it is equally easy to write them off as outliers. This book is an attempt to avoid taking either stance toward successful entrepreneurship. It is also an attempt to raise and examine some new questions that are different than, yet consistent with, issues dominating scholarly discussions of entrepreneurship today.

For example:

- How did Burt Rutan, a graduate of California Polytechnic State University, make the decision to leave a well-paying job at Bede Aircraft in 1974 to strike out on his own and start Rutan Aircraft Factory? What were the antecedents, triggers and processes that brought him to that decision? What other options, if any, did he consider at the point of that decision and what criteria did he use to choose among them?
- How did the characters in the story meet one another? Who, if anyone, introduced them? What led each one to commit to the venture? There are mentions of the venture being staffed by ‘volunteers’. How many of these were selected by the stakeholders already on board and how many self-selected, and how did the network grow?
- Several key stakeholders have outlined their own goals and those of the venture at various points in time. These narratives are not consistent. Yet together they made SpaceShipOne fly. How clear or ambiguous were the individual goals and aspirations, and how were these woven together into the vision that came to exist? How did the vision get embodied in particular project targets over time?
- What is the role of contingency, as opposed to luck, in all of this?

The questions listed above speak to the microfoundations of several extant theories of entrepreneurship. They are not about testing larger theories such as those based on technological evolution or industrial organization. They seek to understand instead how individual stakeholders act; how and why these actions matter; and what they imply about received wisdom. They ask in particular:

To what extent do actual entrepreneurial actions and interactions support or challenge the behavioral (micro) assumptions of received theories at the more macro levels?

For example, to what extent do entrepreneurs use predictive as opposed to other types of information to achieve desired outcomes? The design of SpaceShipOne’s control system offers an intriguing answer as well as raises new questions. As Brian Binnie, the pilot who made the second flight to win the X-prize, described it:

Unlike NASA’s computer-driven space shuttle, SpaceShipOne consists of a simple stick and rudder control system. If somebody had told me when I was in graduate school, ‘Brian, in 35 years you’ll get a chance to fly the first commercial spacecraft with no computers,’ I’d have said, ‘You[‘d] be wrong. People are not going to be that naive.’ (Royce Carlton, 2004)

Ed Bradley's description of the design decision during his *60 Minutes* piece on SpaceShipOne is rather telling, 'Success is in the hands of the pilot'. And when asked about the craft going into a series of unexpected rolls during the September flight, the pilot, Michael Melvill replied: 'I'm very confident when I'm flying a plane. When I've got the controls in my hand, I always believed I can fix this, no matter how bad it gets'.

Why leave it to the pilot to handle the unexpected, when cheap computing beyond the dreams of the Apollo astronauts is readily available? If control is the key, what does relying on a pilot as opposed to a computer buy us? This design decision serves as a peculiarly apt metaphor for explicating the concept of *non-predictive control*, which constitutes an important element of the logic of effectuation.

1.1 KEY RESEARCH ISSUES

Before we get into the details of effectuation, let us consider current theoretical perspectives that could be brought to bear on the SpaceShipOne story.

1.1.1 The Entrepreneur and her Personality

For most psychologists looking at the SpaceShipOne story, key questions would revolve around the personality of Burt Rutan and/or the heuristics and biases he is prone to in his decision-making. McClelland (1967), for example, would argue that Rutan has a high need for achievement; more recent psychologists might hypothesize that he has high self-efficacy or high locus of control (Chen et al., 1998); and researchers in entrepreneurial cognition might predict that he suffers from overconfidence bias (Busenitz and Barney, 1997a; Camerer and Lovo, 1999) or that he has a larger than average Adversity Quotient (Markman et al., 2005); others might postulate the necessity of an entrepreneurial mindset (McGrath and MacMillan, 2000).

Effectuation offers an important challenge to this view by showing that while such hypotheses are both interesting and important, they can at best comprise a rather slim verse in a voluptuous saga such as that of SpaceShipOne. Individual studies find strong relationships between particular psychological variables and particular subsets of entrepreneurs. And subsequently, other studies find relationships in the opposite direction. In sum, psychological factors constitute neither necessary nor sufficient explanations for entrepreneurship or for entrepreneurial performance. Effectuation suggests some new ways of interpreting results from extant

research on psychological variables such as risk perception, overconfidence and reasoning about opportunity costs. Chapters 5, 6 and 9 elaborate upon these.

The effectual challenge to the explanatory power of psychological variables in entrepreneurship is consistent with entrepreneurship research that has extended a similar challenge and urged a closer examination of the processes of new venture creation as inseparable from the personality of the entrepreneur (Gartner, 1988; Shane and Venkataraman, 2000).

1.1.2 The Environment and Evolutionary Processes

For evolutionary theorists, the personality of the entrepreneur is neither necessary nor sufficient; it is in fact often simply irrelevant. What matters is that entrepreneurs create variations. These variations are then subject to selection processes that determine what survives and what does not. There are at least two distinct schools of evolutionary theorists – population ecologists with roots in sociological traditions and economists who are heavily invested in notions of competitive dynamics.

Population ecology

Aldrich (2001) exemplifies this tradition and integrates results from this perspective with entrepreneurship research. Aldrich draws upon the literature on competence-enhancing and competence-destroying innovations (Schmookler, 1962; Tushman and Anderson, 1986; Utterback and Abernathy, 1975) to posit a continuum of entrepreneurial organizations ranging between *reproducers* and *innovators*:

The continuum from reproducer to innovator is defined by outcomes, not intentions (Aldrich and Kenworthy, 1999). Some entrepreneurs deliberately intend to depart from existing knowledge, whereas others give it no thought. Irrespective of intentions, individuals face a tension between deviating from existing routines and competencies and conforming to them. As Campbell (1982) noted, playfulness and experimentation are natural human impulses that have extraordinary strength and persistence, enabling people to generate variations of great utility. However, people's tendencies to defer to the beliefs of others partially offset the full expression of these strengths. (Aldrich, 2001: 80)

After discursive examinations of a variety of topics related to this view of organizational evolution, Aldrich identifies several underresearched areas and theoretical puzzles that suggest specific questions and hypotheses for analysing and explaining phenomena such as SpaceShipOne. Some of these, such as the arguments I develop later about the *positive* role of advice, as opposed to Aldrich's *negative* connotation above, speak directly

to the microfoundations being developed in this book. For example, arguing that ‘entrepreneurial knowledge ultimately derives from a mix of individual experience, connections within networks, learning from others, and blind variation’, Aldrich (2001: 333) raises the puzzle about how entrepreneurs transform this knowledge into competence-destroying organizational innovations: ‘Under what conditions does imitation and borrowing become creativity and innovation?’ In the case of SpaceShipOne, this might translate to an examination of how Rutan moved from the design of research aircraft in and for government bureaucracies to designing a privately funded and affordable spaceship carrier.

Another relevant puzzle Aldrich raises has to do with collective action: ‘We need to study the process by which organized action by clusters of actors contributes to the development of new organizations, populations, and communities’ (Aldrich, 2001: 332). Here the relevance to the SpaceShipOne story is rather obvious – a set of disparate individuals, almost maverick participants, had to come together to make SpaceShipOne fly. Currently, there is very little theoretical light to be shed on how such a network of stakeholders comes to be.

Effectual logic seeks to shed light on both these issues: (a) micro-mechanisms that help transform who the entrepreneur is, what she knows and whom she knows into new ventures and markets; and (b) micro-processes that help founding entrepreneurs create new networks of self-selected stakeholders. Chapter 5 is devoted to explicating these in some detail.

Competitive dynamics

There is a long tradition in economics of viewing entrepreneurship as a balancing act within the larger drama of competitive dynamics. Schumpeter (1976), for example, posited the entrepreneur as the source of disequilibrium in the economy; Kirzner (1979) argued for entrepreneurial alertness as the trigger to the market processes that bring the economy back to equilibrium from disequilibrium; and there are a variety of shades in between including Baumol’s (1993) spectrum of productive, unproductive and destructive entrepreneurship.

Each of these views, however, makes certain assumptions about individual decision behavior and the conditions under which decisions are made. In particular, they assume that the future, albeit unknown, is predictable to a greater or lesser degree; that decision-makers know what they want – i.e. their preferences are given and well ordered; and that the environment is mostly exogenous to the individual’s actions. Effectuation, as we will see later, goes to work in spaces where these assumptions do not hold. In other words, it helps push the basic economic world-view about individuals, firms and markets beyond its current frontiers. For example, in the case of

SpaceShipOne, it is not clear what would count as a market, let alone what would be identifiable as equilibrium or disequilibrium in such a market.

Trying to understand the SpaceShipOne story through the competitive dynamics lens requires us to deal with slippery phenomena such as nascent markets, latent demand, technology trajectories and so on. It is not clear even now that there is actual demand or viable supply to sustain a space tourism industry or whether there ever will be. What existed at the time Rutan began developing SpaceShipOne can best be characterized as a technological frontier dominated by a bureaucratic monopoly, NASA (the National Aeronautics and Space Administration). Only time will tell whether SpaceShipOne is the beginning of a new gale of creative destruction or whether Burt Rutan is an alert entrepreneur who spotted a great disequilibrium. Will this story end in productive gains to the economy or destroy civilization as we know it?

In the meanwhile, the actors in the drama continue to act, without knowing when and how the curtain might come down, or even what the next act will turn out to be. Their actions, as Shackle (1966) would argue, are not based on data, but mostly on *figments*. Effectuation explicates how and on what basis they act; and in what way that basis is consistent with or contrary to assumptions about human action in major economic theories. In particular, it begins to address questions that Dosi (1997) posed after reviewing empirical results from industrial organization as well as micro-, macro- and evolutionary economics:

One of the points that I have tried to argue is that an interpretation of technological dynamics which significantly relaxes the commitments to equilibrium, rationality, and inter-agent homogeneity is straight-forwardly borne by the current evidence, and is also beginning to generate formalised theoretical tales – with implications well beyond technological change itself, addressing basic issues like how the future is linked to the past, how individual (possibly mistake[s]-ridden) decisions aggregate into collective outcomes, and how problem solving knowledge is accumulated in society. (Dosi, 1997: 1544–5)

Effectuation also begins to add microfoundations to more recent theorizing in entrepreneurship that has begun putting entrepreneur (person) and market (opportunity) together in interesting ways. In particular, I will examine the work of Casson (2003) and Shane (2003b). It is important to note that the latter directly builds on the seminal work of Venkataraman (1997).

1.1.3 Putting Entrepreneur and Environment Together

Mark Casson's theory of entrepreneurship takes its cue from Schumpeter, Knight and Hayek, each of whom identified the necessity for entrepreneurial

‘judgment’ in the face of extreme uncertainty. Their work brought to light the problem of partial knowledge (or the lack of it) in the entrepreneurial context. Each made important contributions to pushing forward mainstream economics beyond assumptions of perfect information and extant markets. Casson argues that this entrepreneurial ‘judgment’ is based on unique information that the entrepreneur exploits to create a ‘market-making’ firm. Casson’s notion of ‘market-making’ goes beyond simple arbitrage and involves overcoming obstacles to trade that arise primarily due to ignorance (Casson, 2003). Thus Casson’s entrepreneur specializes in the acquisition and processing of information that feed his good judgment and help him identify situations where competition from other entrepreneurs is relatively sparse. The market-making entrepreneur then proceeds to erect barriers to entry with a view to maximizing returns.

If we look at the story of SpaceShipOne through Casson’s theory, Rutan’s unique résumé will loom large in the explanatory equation. But it is not quite clear that Rutan and his team set out to maximize returns in any way. Nor is it even clear that they are in the process of ‘market-making’ in the specific sense in which Casson uses the term. Yet several of his conclusions, such as the role of previous experience and reputation in reducing the costs of market-making, the necessity of negotiation and other organizational skills etc., are relevant and valid in understanding the space tourism market-in-the-making. It is here that the ideas in this book matter. They look into the *content* of these skills that Casson identifies as necessary to the entrepreneurial function. A close examination of those contents reveals some aspects that are contrary to certain details in Casson’s theory. For example, Casson preserves the essentially adversarial tone of most stakeholder negotiations. However, empirical work on effectuation shows that standard arguments from contract theory about threats of opportunism and moral hazards appear not to hold up well in how expert entrepreneurs actually build and exercise good judgment, and make new markets.

Elements of entrepreneurial expertise identified in this book also overlap with and differ from Shane’s theory about entrepreneurial opportunities. I am in complete agreement with Shane and Venkataraman (2000) that we need to look into the nexus of enterprising individuals and valuable opportunities if we are to understand entrepreneurship better. Furthermore, expert entrepreneurship finds common ground with Shane’s interest in a means–ends framework as the key piece in the entrepreneurial puzzle. However, as it will become amply clear later in the book, there is a fundamental difference in the logical frame used by Shane’s entrepreneur, who is engaged in the discovery and exploitation of opportunities, and the effectual entrepreneur, who ends up *fabricating* them from the mundane realities of her life and value system.

Even at the risk of oversimplification, a quick application of the two views to the case of SpaceShipOne might be useful here. Shane's theory suggests that Rutan saw the profit opportunity in space tourism and therefore undertook the development of SpaceShipOne. The ideas in this book suggest that the market opportunity for space tourism (and any profits it may or may not entail) *ensued* from what Rutan and his stakeholders *did*. Their actions in turn sprang from the intersubjective interactions between Rutan (with his love of and skills for designing aircraft), Allen (with his passion for the exploration of space), and a variety of stakeholders, each of whom self-selected into the venture by committing what s/he could afford to lose without worrying about positive cash flows down the road.

Of course, neither a brief exploration of theories of entrepreneurship, nor an impressionistic tracing of overlaps and contrasts with effectuation can do justice to the task of effectively wrestling with extant theories. Nor is it my purpose to attempt that here. I suspect discerning readers (assuming they find the ideas in this book worth their interest) will undertake that task in a far more unbiased and ruthless manner than I can. And I am happy to leave that to them.

Also, at first glance, SpaceShipOne may appear to be a spectacular instance. But as the theoretical perspectives listed above show, it raises a variety of general issues of great interest to the field of entrepreneurship. Each of these issues has to do with unspecified microfoundational mechanisms that make theories of entrepreneurship work. In my view, these mechanisms comprise the elements of entrepreneurial *expertise*. And my objective in this book is to identify these elements of entrepreneurial expertise and relate them in rigorous detail to the making of phenomena such as SpaceShipOne.

1.2 ENTREPRENEURSHIP AS A DOMAIN OF EXPERTISE

In sum, one can argue that entrepreneurial performance has traditionally been studied either (1) as a set of personality traits of the entrepreneur that explains the success or failure of the firms he or she creates (Llewellyn and Wilson, 2003), or (2) as a set of circumstances or attributes of the project and its environment that contains the seeds of its success or failure (Thornton, 1999). In the former case, potential entrepreneurs either have the right traits, or they don't. And if they don't, entrepreneurs are urged to cultivate them. In the latter, potential entrepreneurs are called on to develop strategies and skills for recognizing, identifying and exploiting high-potential opportunities.

I intend to come at the subject from a different angle by focusing on entrepreneurial expertise. Expertise consists in tacit as well as learnable and teachable aspects of experience that are related to high performance in specific domains. Instead of taking either traits or circumstances as inputs and trying to explain variance in performance, the expertise lens focuses on understanding commonalities across a variety of experts in a single domain, *given* high levels of performance. In keeping with the literature, I define an expert as 'someone who has attained a high level of performance in the domain as a result of years of experience' (Foley and Hart, 1992) and deliberate practice (Ericsson et al., 1993).

1.2.1 Key Empirical Questions

I started my empirical work by asking the following question:

What commonalities and differences exist in the decision-making processes of a group of expert entrepreneurs who start with the same idea for a new venture and face exactly the same set of decisions in building it?

Because all decisions in an entrepreneurial setting pertain either to future markets, or to markets for future goods and services (Venkataraman, 1997), they involve risks and uncertainties of various kinds. Also, human beings vary in their beliefs about the predictability of the future (Kahneman et al., 1982). This led me to the second question:

In the face of non-existent or not-yet-existent markets, what underlying beliefs about the predictability of the future influence the decisions expert entrepreneurs make as they build a new venture?

One of the simplest ways to find out what expert entrepreneurs have learned from their experience is to ask them. Interviews of entrepreneurs and their stakeholders, triangulated with published data, can and do form the basis of valid studies with interesting results (Donald, 2001; Jennifer and William, 1999; Norman and John, 1983). But expert entrepreneurs are usually good storytellers (Lounsbury and Glynn, 2001). Therefore, studies based on their stories after the fact may be subject to retrospective bias. To get around this bias, I used think-aloud verbal protocols. In this method, subjects in the study are given a set of typical problems from their domain of expertise and asked to think aloud continuously as they solve the problems.

The essential logic behind the use of protocol analysis can be summarized as follows: while retrospective recall allows subjects to make up good stories about how they believe they solve problems, and stimulus-response methods force researchers to deduce the subjects' decision-making processes after the

fact, concurrent verbalization allows the researcher to look directly inside the black box of cognitive processing, because of the structure of the brain's short term memory system. As Ericsson and Simon put it:

There is a dramatic increase in the amount of behavior that can be observed when a subject is performing a task while thinking aloud compared to the same subject working under silent conditions. (Ericsson and Simon, 1993: xiii)

1.2.2 Studying Entrepreneurial Expertise

I had the good fortune to work with Herbert Simon during the last six years of his life. He, along with his colleagues, led the field of cognitive science in investigations of expertise over 30 years ago. The earliest studies had to do with chess grand masters (Chase and Simon, 1973). In their early study of expert chess players, Chase and Simon (1973) observed that simple intelligence had no correlation with chess mastery, a finding later confirmed more generally by others (Ceci and Liker, 1986; Chase and Simon, 1973; Doll and Mayr, 1987; Taylor, 1975).

Instead, the grand masters' expertise had to do with other factors, such as how players stored information, perceived problems and generated solutions. Building on the foundation laid by Simon and his colleagues, the field of expertise studies began to expand. While some of the early empirical literature and theory development focused on chess, subsequent work has validated and expanded the theoretical base to include more dynamic settings where rules are not as well defined and outcomes are linked with complex tasks over time. Examples include taxi-driving (Kalakoski and Saariluoma, 2001), medicine (Boshuizen and Schmidt, 1992), music composition (Krampe and Ericsson, 1996), fire-fighting (Hoc and Moulin, 1994), consumer decision making (Selnes, 1989), and scientific discovery (Klahr and Simon, 2001). It is important to note that the majority of findings in less dynamic settings are robust to more dynamic settings as well.

A detailed review of the expert–novice literature would take up more shelf-space than I want to devote to the topic here. For a complete and comprehensive reference on the topic please see Ericsson et al. (2006).

What makes the study of any particular domain of expertise interesting is that the elements of expertise may be organized into a set of domain-specific heuristic principles, which can thereafter be either embodied in expert systems or used as testable and teachable decision-making and problem-solving techniques. Studying entrepreneurship as a form of expertise not only allows us to develop such techniques for entrepreneurship, but also introduces an important new perspective to the field that especially impacts current views about entrepreneurial performance.

1.2.3 Performance of the *Entrepreneur*, not just of the Firm

Current studies of entrepreneurship tend to focus on the performance of the entrepreneurial venture as the primary dependent variable. Even the literature on traits, knowledge acquisition (tacit and otherwise), learning, and the use of general (non-domain-specific) heuristics and biases all seeks to explain how these factors influence the performance of the firms that entrepreneurs create. The view from entrepreneurial expertise, however, turns the spotlight on the performance of the *entrepreneur*, sometimes in harmony with, but at other times in opposition to, the performance of the *firm*. Entrepreneurs, in current scholarship, are seen as instruments in the birth and growth of firms. Entrepreneurial expertise proposes an instrumental view of the firm instead.

Studies of expertise suggest that although expertise often overlaps with and explains success, expertise is not the same as success (Gardner, 1995; VanLehn, 1996). The fact that a chess player wins a tournament does not automatically imply he is a grand master or even a run-of-the-mill expert; similarly, being an expert chess player does not guarantee a win. This is even more applicable to entrepreneurial expertise. An expert entrepreneur may found one or more failed firms; and novice entrepreneurs may achieve supra-normal profits in their very first ventures.

This suggests that by equating entrepreneurial performance *exclusively* with firm performance, we are overlooking an important avenue through which expert entrepreneurs achieve success, namely through *failure management*. Sustained performance over long periods of time requires that experts outlive failures, cumulate successes, and learn from both. Therefore the content of entrepreneurship ought to include the separation of firm performance from the performance of the entrepreneur. This separation also implies that studying expertise in complex domains involves defining experts using criteria beyond success and failure. Chapter 6 explores some of the subtleties involved in the relationships between entrepreneurial expertise and the performance of firms and entrepreneurs.

I will describe my research design in detail and present the methods of analyses in the next chapter. I end this chapter with a brief summary of results to be developed through the rest of the chapters in the book.

1.3 SUMMARY OF FINDINGS: ELEMENTS OF ENTREPRENEURIAL EXPERTISE

The following is a brief summary of the findings and the subsequent theoretical developments. The summary is divided into three parts.

1.3.1 Process Elements of Entrepreneurial Expertise

- Expert entrepreneurs begin with who they are, what they know and whom they know, and immediately start taking action and interacting with other people.
- They focus on what they *can* do and do it, without worrying much about what they *ought* to do.
- Some of the people they interact with self-select into the process by making commitments to the venture.
- Each commitment results in new means and new goals for the venture.
- As resources accumulate in the growing network, constraints begin to accrete. The constraints reduce possible changes in future goals and restrict who may or may not be admitted into the stakeholder network.
- Assuming the stakeholder accumulation process does not prematurely abort, goals and network concurrently converge into a new market and a new firm.

The process is graphically represented in Figure 5.1 and explicated in greater detail in Chapter 5.

1.3.2 Principles of Entrepreneurial Expertise

At each step of the process, expert entrepreneurs use the following principles. Each principle inverts key decision-making criteria in received theories and conventional management practices.

The *bird-in-hand* principle

This is a principle of means-driven (as opposed to goal-driven) action. The emphasis here is on creating something new with existing means rather than discovering new ways to achieve given goals.

The *affordable-loss* principle

This principle prescribes committing in advance to what one is willing to lose rather than investing in calculations about expected returns to the project.

The *crazy-quilt* principle

This principle involves negotiating with any and all stakeholders who are willing to make actual commitments to the project, without worrying about opportunity costs, or carrying out elaborate competitive analyses.

Furthermore, who comes on board determines the goals of the enterprise. Not vice versa.

The lemonade principle

This principle suggests acknowledging and appropriating contingency by leveraging surprises rather than trying to avoid them, overcome them, or adapt to them.

The pilot-in-the-plane principle

This principle urges relying on and working with human agency as the prime driver of opportunity rather than limiting entrepreneurial efforts to exploiting exogenous factors such as technological trajectories and socio-economic trends.

Each of the five principles above embodies techniques of non-predictive control – i.e. reducing the use of predictive strategies to control uncertain situations. Together, these principles point to a logic of action called *effectuation*.

Effectuation is the inverse of causation. Causal models begin with an effect to be created. They seek either to select between means to achieve those effects or to create new means to achieve preselected ends. Effectual models, in contrast, begin with given means and seek to create new ends using non-predictive strategies. In addition to altering conventional relationships between means and ends and between prediction and control, effectuation rearranges many other traditional relationships such as those between organism and environment, parts and whole, subjective and objective, individual and social, and so on. In particular, it makes these relationships a matter of *design* rather than one of *decision*.

Empirically, entrepreneurs use both causal and effectual approaches, in a variety of combinations. Use of and preference for particular modes is related to the entrepreneur's level of expertise and where the firm is in its life cycle. *Theoretically*, however, it makes sense to analyse causal and effectual approaches as a strict dichotomy.

Note: The point about the rich and complex texture of empirical reality and the stark simplicity of theoretical dichotomies is worth belaboring. The Argentine writer Jorge Luis Borges once wrote about mapmakers who became so obsessed with correspondence to reality that their map became larger and larger until it was congruent with the city. Such a map, of course, is utterly useless. I propose the logic of effectuation as one among many useful maps to the same city. It is not a negation of alternate logics such as those underlying subjective expected utility models of economics,

resource-dependent models of social movements, or opportunity recognition models of entrepreneurship. My only claim (which I work hard to establish through this book) is that effectuation has its particular and unmatched uses in current theorizing about entrepreneurial (micro) behavior that lies at the heart of many economic theories and social philosophy.

1.3.3 *Effectuation: The Logic of Entrepreneurial Expertise*

By *logic*, I mean an internally consistent set of ideas that forms a clear basis for action upon the world. A *causal* logic is based on the premise: ‘To the extent we can predict the future, we can control it.’ An *effectual* logic is based on the premise: ‘To the extent we can control the future, we do not need to predict it’.

The use of an effectual logic implies a certain stance toward the world and its occupants. In particular:

- Effectuators see the world as open, still in-the-making. They see a genuine role for human action. In fact, they see both firms and markets as human-made artifacts. In this sense, effectual entrepreneurship is not a social science. It is a science of the artificial (Simon, 1996).
- Effectuators very rarely see opportunities as given or outside of their control. For the most part, they work to *fabricate*, as well as recognize and discover opportunities (Sarasvathy et al., 2003).
- Effectuators often have an instrumental view of firms and markets. They do not act as though they were the agents of the firm or as suppliers catering to demand – firms are a way for them to create valuable novelty for themselves and/or for the world; markets are more likely *made* than *found*; and a variety of stakeholders including customers are partners in an adventure of their own making.
- Effectuators do not seek to avoid failure; they seek to make success happen. This entails a recognition that failing is an integral part of venturing well. Through their willingness to fail, effectuators create temporal portfolios of ventures whose successes and failures they manage – learning to outlive failures by keeping them small and killing them young, and cumulating successes through continual leveraging. In an effectual universe, success/failure is not a Boolean variable and the success/failure of the entrepreneur does not equal the success/failure of the firm.

Effectuation matters, not merely because expert entrepreneurs prefer an effectual logic over a causal one, but because of the details it offers of a *comprehensive alternate frame* for tackling entrepreneurial problems.

Which frame entrepreneurs use influences how they formulate problems; what alternatives they perceive and generate; which constraints they accept, reject, and/or manipulate and how; and why they heed certain criteria rather than others in fabricating and implementing new solutions. Logical framing matters because it makes a real difference in the world and makes a world of difference in the reality entrepreneurs perceive and make possible or impossible.

In sum, effectual, as opposed to causal, framing is about transforming the problem space and reconstituting extant realities into new opportunities.

NOTE

1. I have put together the story from dozens of published reports.

2. What I found and how

2.1 RESEARCH DESIGN AND METHODS

This chapter presents the rationale for the research design, details of think-aloud protocols, the process for selecting subjects, and the research instrument.

2.1.1 Rationale for Research Design: Carnap versus Popper

There are at least two views on the scientific design of a rigorous empirical study. The difference between the two views can be traced back to an old argument. As Hacking (1983) chronicles it:

Rudolf Carnap and Karl Popper both began their careers in Vienna and fled in the 1930s. Carnap, in Chicago and Los Angeles, and Popper, in London, set the stage for many later debates.

They disagreed about much, but only because they agreed on basics. They thought that the natural sciences are terrific and that physics is the best. It exemplifies human rationality. It would be nice to have a criterion to distinguish such good science from bad nonsense or ill-formed speculation.

Here comes the first disagreement: Carnap thought it is important to make the distinction in terms of language, while Popper thought that the study of meanings is irrelevant to the understanding of science. Carnap said scientific discourse is meaningful; metaphysical talk is not. Meaningful propositions must be *verifiable* in principle, or else they tell nothing about the world. Popper thought that verification was wrong-headed, because powerful scientific theories can never be verified. Their scope is too broad for that. They can, however, be tested, and possibly shown to be false. A proposition is scientific if it is *falsifiable*. In Popper's opinion it is not all that bad to be pre-scientifically metaphysical, for un-falsifiable metaphysics is often the speculative parent of falsifiable science.

The difference here betrays a deeper one. Carnap's verification is from the bottom up: make observations and see how they add up to confirm or verify a more general statement. Popper's falsification is from the top down. First form a theoretical conjecture, and then deduce consequences and test to see if they are true. (Hacking, 1983: 3)

Most management theorists have adopted Popper's view that good studies are theory-driven and proceed from the development of falsifiable hypotheses to their test and rejection or provisional acceptance. But some

traditions, such as the Carnegie tradition developed by Herbert Simon and his colleagues, embrace Carnap's views. They advocate a process that begins with direct observation to identify empirical regularities followed by the development and testing of appreciative theory (Nelson and Winter, 1982). Simon studied with Carnap at Chicago. As Simon's student, I adopted their views in my own empirical work.

I designed my study of entrepreneurial expertise first to identify commonalities across expert entrepreneurs (Chapter 2), next to examine alternative interpretations (Chapter 3), and then to develop appreciative theory in some depth (Chapters 4 and 5). Further evidencing and verification of the theory proceeded through a variety of later studies, some of which (both finished and works-in-progress) are discussed in Chapters 3 and 12. Consequences of the theory for performance are derived in Chapter 6, for teaching in Chapter 11, and relationships to larger issues in the history of ideas are considered in Chapters 7 through 10.

As I began developing theory induced from the empirical work, I came upon the philosophy of pragmatism and James's ideas on radical empiricism. Thereafter (to put it in Jamesian terms) actually *doing* science 'in the teeth of the stubborn facts' overwhelmed all *oughts and oughtn'ts* that philosophers of science were arguing about. But I will reserve that story for Chapter 3. For now, I will continue with descriptions of methods and design as I chose and implemented them in my empirical work.

2.1.2 The Method: Think-aloud Verbal Protocols

In the past 30 years, hundreds of studies have been conducted using think-aloud verbal protocols. These studies have helped develop models of cognitive processes and heuristic strategies used by human beings in a wide variety of problem-solving and decision-making tasks.

In a detailed investigation into conceptual and methodological issues involving verbal protocols, Ericsson and Simon (1993) provided examples from more than 200 empirical studies that used think-aloud verbal protocols, in such domains as chess (Charness, 1989), medical diagnosis (Johnson et al., 1981), and mathematics (Webb, 1975). Some examples from business included: decision making (Montgomery and Svenson, 1989); accounting (Belkaoui, 1989); argumentation in management consulting (Young, 1989); and software cost estimation (Mukhopadhyay et al., 1992).

The efficacy of the method has recently been revalidated in Kuusela and Paul (2000):

In verbal protocol analysis, verbalization can occur either during decision making (concurrent data) or after (retrospective data). Although both methods

have advantages and disadvantages, no empirical research has focused on a direct comparison. This study compared the effectiveness of concurrent and retrospective data for revealing the human decision making process. In general, the concurrent protocol analysis method outperformed the retrospective method. Not only was the number of concurrent protocol segments elicited higher than that of retrospective protocol segments, but concurrent data provided more insights into the decision-making steps occurring between stimulus introduction and the final choice outcome. However, retrospective protocols offer an interesting advantage: More statements about the final choice are provided in retrospective protocols than in concurrent protocols. (Kuusela and Paul, 2000: 387)

There is also evidence that think-aloud verbal protocols are a fruitful method for studying the decision-making processes of entrepreneurs. In Sarasvathy et al. (1998), we used think-aloud protocols to discover detailed differences between entrepreneurs and bankers in their perception and management of a variety of risks.

As mentioned earlier, the idea behind this method is to have subjects in a problem-solving or decision-making experiment think aloud continuously as they solve problems or make decisions. The think-aloud verbal protocols are collected on tape, the tapes transcribed, and the transcriptions analysed using a variety of quantitative and qualitative techniques.

The method required two preparatory tasks. First, a sample of expert entrepreneurs had to be selected. Then, a set of typical decision problems that occur in a startup had to be developed.

2.1.3 Subjects: Expert Entrepreneurs

For the purposes of this study, I defined an expert entrepreneur as a person who, either individually or as part of a team, had founded one or more companies, remained a full-time founder/entrepreneur for 10 years or more, and participated in taking at least one company public. This last criterion not only satisfied a very stringent definition of entrepreneurial expertise, but also provided additional data about the actual experience of the subjects in the form of annual reports, press kits etc.

I used two sources to identify possible subjects for the study: (1) a list of the 100 most successful entrepreneurs from 1960 to 1985, compiled by the venture capitalist David Silver (Silver, 1985a); and, (2) the list of national winners of the Entrepreneurs of the Year awards, compiled by Ernst & Young. Together, the two sources drew their members from a pool that included virtually every successful company created by an entrepreneur in the USA from 1960 through 1996. As clearly outlined in their publications, both sources used several evaluation procedures and qualification criteria to select their lists from the complete populations of entrepreneurial

companies in their respective times. Thus the sample for this study was drawn indirectly from the complete population of entrepreneurs at large, and directly from a complete population of expert entrepreneurs.

Sample selection began with the elimination of private companies from both sources. This provided a list of 245 entrepreneurs (43 from Silver; 202 from Ernst & Young) who were invited to participate in the study. Fifty-five letters were returned because the addressee was unknown or deceased; this left a net of 190 invitees. Of the 71 responses I received, 26 were rejections. Of these, all except two stated lack of time or work overload as the reason for not participating. The remaining two stated they did not want to participate in the study. In the final tally, 45 entrepreneurs agreed to participate in the study. I explored the 119 non-responses to find out whether there were any systematic differences between respondents and non-respondents. I found no non-response bias in terms of firm size, entrepreneur bias, or industry group. Descriptive statistics for the subject pool are given in Table 2.1.

The characteristics of the final subject pool suggested that the sample was fairly representative of the population of expert entrepreneurs. Subjects from 17 states across the USA were all male, 90 per cent American, 41 to 81 years old, with two-thirds having graduate degrees. Although all subjects were male, there was no reason to believe that the sample was therefore less representative, because the percentage of female entrepreneurs who fulfilled the necessary criteria in the original population was less than one-half of 1 per cent to begin with. In addition to founding a company and actively running it, the subjects had a variety of entrepreneurial experiences including founding and running multiple ventures, suffering failures both before and after their successes, weathering mergers and acquisitions, major PR coups and disasters, taking companies public, and even vice versa.

The companies they built and were involved in ranged in annual sales from \$200 million to \$6.5 billion as of March 1997. The companies also spanned a wide range of industry groups, including retail goods and services, household products, teddy bears, ice cream, razors, security services,

Table 2.1 Descriptive statistics of expert entrepreneurs

<i>Expert entrepreneurs subjects (N = 27)</i>				
Variable	Mean	s.d.	Minimum	Maximum
Year of birth	1943	8.8	1918	1953
Ventures started	7.3	7.4	3	40
Years worked for above	21.6	9.3	12	43

contract programming, computers, software, telecommunications, media, biotechnology, environmental technologies, steel, railroads, power plants, and more.

Each subject agreed to devote two hours to the experiment, which consisted of solving ten typical decision problems that occur in a startup. I estimated, based on a pilot study, that subjects would require approximately an hour and a half to complete the experiment. The remaining time was set aside for a semi-structured informal interview, in which I asked them to talk about decisions they had made in building their real-life companies. Subjects did use an hour and a half on average for completing the decision-making experiment. Several spent more than the remaining half hour in the semi-structured interview.

I collected 30 protocols and held over the remaining 15 for a follow-up study. This decision was based on the fact that the data began to converge on a clear pattern by the twentieth protocol and increasing redundancies were observed thereafter. Of the 30, only 27 were appropriate for analysis. Two subjects found it very difficult to do the experiment and decided to participate only in the interview, one due to advanced age and the other because of language problems. The third insisted on reading all the problems before 'solving' them, which invalidated his participation because of the way the problems were organized.

2.1.4 The Research Instrument

The subjects in the sample had built companies in completely disparate industries. This variation was deliberate, and appropriately representative of the overall population of expert entrepreneurs, but it meant that the idea at the core of the problems in the research instrument had to cut across industries. I decided that the only element common to all the subjects was entrepreneurship. So I made entrepreneurship itself the idea around which the problems in the study would be designed. I did this by creating an imaginary product, a game of entrepreneurship called *Venturing*.

The final research instrument used in the study consisted of ten entrepreneurial decision problems that needed to be solved in transforming *Venturing* into a firm. I began constructing the research instrument by developing and testing several problems through informal consultations with local (Pittsburgh) entrepreneurs and then conducting a pilot study. These entrepreneurs were not subjects in the final study. I then used a variety of case studies and histories of startups to double-check my initial selection and to retain only the most frequently mentioned and widely described subset of problems. The instrument actually used in the study is reproduced as Appendix 1.

Either during the experiment or after the interview (when I asked them about it specifically), all subjects stated that they had found the problems in the experiment realistic; 18 mentioned that the problems had reminded them of their own experiences in the real world. Six subjects requested a copy of the instrument and said they would use it in hiring and training new managers. All of them expressed a desire to read the results of the study and agreed to complete any follow-up procedures that might be required, such as questionnaires and/or telephone interviews. I also collected several published materials about the subjects and the firms they had founded, including: résumés, press kits, articles in the popular press and annual reports.

2.2 QUANTITATIVE DATA ANALYSIS

2.2.1 Prelude to the Development of Hypotheses

As I traveled around the USA collecting think-aloud protocols from the expert entrepreneurs in my sample, I began to explore the protocols with a view to developing an analytical template for discovering commonalities in their approaches to decision making. After I had collected the first three protocols and repeatedly listened to the tapes, I began to make specific predictions about what would happen in the next protocol. After collecting the next one, I would check my predictions and develop new ones. In this manner, I identified several themes that emerged from the data and converged into possibilities for analyses. That then led me to the relevant literature to look for hypotheses development.

The first theme that emerged from the data was: *Expert entrepreneurs distrust market research*. I am here referring to market research in the textbook sense, namely, surveys, focus groups and other systematic attempts to predict potential demand. But why? And what do they do instead? Re-immersing myself in the data clarified the larger issue. The subjects in my study not only explicitly refused the efficacy of formal market research. Consciously or unconsciously, they revealed in their decision-making a profound distrust of attempts to predict the future. That raised the question, 'How does one make decisions without trying to predict the future?' Armed with this new question, I began to develop hypotheses to test with my data.

2.2.2 Relevant Literature for the Development of Hypotheses

Historically, the research on decision-making under uncertainty can be divided into (a) the normative development of rational decision models

(MacCrimmon and Stanbury, 1986) and (b) empirical investigations into bounds on that rationality in actual decision makers (Kahneman and Tversky, 1979).

The normative development is rooted in the conceptual distinction between 'risk' and 'uncertainty' explored by Knight (1921). The commonly used statistical metaphor of the urn containing different colored balls illustrates the difference between the two (Kamien, 1994). Consider first a game in which you draw balls from an urn containing five green balls and five red balls. If you draw a red ball, you win \$50. For any given draw, you can calculate precisely the probability of getting a red ball, because you know the distribution of balls in the urn. This kind of game is an example of risk. Now consider a game in which you are again awarded \$50 for drawing a red ball, but this time you do not know how many balls are in the urn, what colors they are, or if there are any red balls at all. This kind of game exemplifies uncertainty. In statistical terminology, decisions involving the first type of urn with the known distribution – a situation characterized by risk – call for classical analytical techniques; and the decisions involving the second type of urn with the unknown distribution – a situation characterized by uncertainty – call for estimation techniques. Once the underlying distribution is pieced together through estimation procedures, the urn with the unknown distribution is transformed, as it were, into the urn with the known distribution and becomes susceptible to analytical techniques.

Real-life examples of people applying analytical techniques to deal with risk include buying insurance, buying and selling stock, and engaging in various types of gaming. Forecasting demand for very well-established products such as Coca-Cola and personal computers nowadays also falls within this category. Some real-life examples of the application of estimation techniques to problems characterized by uncertainty include environmental pollution, global warming, genetic cloning and commercialization of innovations.

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

Both normative approaches have been qualified by other researchers who have shown that human beings in general are not strictly rational (Simon, 1959b). Instead, their rationality is bounded by cognitive limitations such as physiological constraints on computational capacity (Payne et al., 1993); and psychological limitations such as biases and fallacies (Bar-Hillel, 1980; Tversky and Kahneman, 1982). Yet such findings do not imply that

decision-makers are irrational. Rather, the evidence suggests that within certain bounds, decision makers use heuristics and inductive logics that often result in very effective decisions (Gigerenzer et al., 1988).

The arguments from both perspectives – rationality and bounded rationality – can be summarized as follows. If decision makers believe they are dealing with a measurable or relatively predictable future, they will tend to do some systematic information gathering and invest some effort on a reasonable analysis of that information, within certain bounds. Similarly, if they believed they are dealing with relatively unpredictable phenomena, they will try to gather information through experimental and iterative learning techniques aimed at first discovering the underlying distribution of the future. This logically implies that the decision maker's underlying beliefs about the future phenomena that influence a particular decision can be deduced by examining the types of heuristics and logical approaches they use to make the decision.

Harking back to Knight's analysis of uncertainty, I began to see that he had discussed not two, but three, types of uncertainty: the first consisting of a future with a known distribution and an unknown draw; the second consisting of both an unknown distribution and an unknown draw; and a third category consisting of a future that was not only unknown, but unknowable even in principle. In Knight's own words, 'The distinction here is that there is *no valid basis of any kind* for classifying instances' (Knight, 1921: 225).

It became very clear to me that I would need a taxonomy of at least three types of approaches for dealing with the three types of beliefs about the future. The first two were easy and suggested by Knight himself. As mentioned earlier, the first case of known distribution and unknown draw called for analytical methods of the classical sort. 'The second case of unknown distribution and unknown draw called for estimation methods including Bayesian estimation. The third, however, stumped even Knight (1921: 227):

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

So what would my subjects do if they believed the future embodied this third type of *Knightian* uncertainty? Here there seemed no way out but to elicit the answer directly from my data. Ironically, the utter lack of theories in the literature with regard to a logic of decision making under Knightian

uncertainty led me to make a judgment call (*à la* Knight's notion of 'judgment' above). I decided to create a catch-all third category into which everything that did not fit the first two would be dumped; thereafter, I would directly engage with the data through qualitative analyses to get them to speak to me about a logic for dealing with Knightian uncertainty. I called that logic *effectuation*. I used the word 'effectuation' as a cognitive inverse of the term 'causation' – a usage in line with its dictionary meaning indicating human agency, or a causal intervention by human beings in the real world. The rest of this book is an attempt to describe, organize, clarify, shore up and cogently enhance what the data revealed to me about effectuation and examine how my initial data fit with subsequent data that my collaborators and I have since been collecting.

2.2.3 Beliefs About the Predictability of the Future: Dealing with Risk, Uncertainty and Knightian Uncertainty

Besides varying in predictability, future phenomena can also vary in the degree to which they are influenced by human action and nature. Table 2.2 provides a taxonomy of future phenomena and methods that researchers have developed to help deal with them. Since the rest of the book deals with effectuation in great detail, here I only introduce it in the most general fashion, to explain how I analysed the protocols collected from expert entrepreneurs.

Effectuation is rooted in the realization that human beings cause the future and, therefore, the future can be controlled and/or created through consensual human action. To explain it in terms of the urn metaphor, people who use the logic of effectuation do not waste energies trying to predict the distribution of balls in the urn. Instead they gather red balls in any way they can and put them in the urn; they also persuade people who

Table 2.2 Taxonomy of future phenomena

	<i>High predictability</i> (Risk/equilibrium)	<i>Low predictability</i> (Uncertainty/disequilibrium)
<i>Nature only</i>	<i>Example:</i> Short-term weather patterns	<i>Example:</i> Earthquakes in Pennsylvania
<i>Human action and nature</i>	<i>Known distribution</i> Analysis (classic probability)	<i>Unknown distribution</i> Estimation (subjective probability)
<i>Primarily human action</i>	<i>Known rules</i> Game theory	<i>Unknown rules</i> Effectuation

own red balls to bring them to the urn and play the game as their partners. The idea is to rig the urn in favor of one's own draws. If that is not feasible, and the effectuator has access only to green balls, then the effectuator refuses to play the game that rewards red balls, and designs a new game in which green balls win.

Of course, such a view may express hopes rather than realities, and many entrepreneurs in the real world do fail. This fact does not negate the hypothesis that effectuators are often more concerned with molding, or even creating, the part of the world with which they are concerned than with predicting it and reacting to the prediction.

2.2.4 The Null Hypothesis

Based on the conceptual development above, we can expect the decision processes of the subjects in the study to be influenced by one of three beliefs about the predictability of the future:

1. They could believe the future to be driven by highly predictable phenomena involving human action and natural phenomena or human action alone (e.g. business cycles). In this case, their decision processes would consist of seeking detailed and systematic information, and analysing that information with a view to attaining the specific goals of each decision. The emphasis here is on attempting to predict the future in order to make rational decisions. I call this ANL for analysis.
2. They could believe that the future is driven by phenomena that are highly unpredictable (e.g. stock prices), but can be studied in a systematic way through testing and experimentation, and about which reliable expertise can be developed over time. In this case, their decision processes will consist of techniques of testing and experimentation, and/or consulting with experts and their subjective probabilities. Here too the emphasis will be on prediction, but the idea is that predictions are refined through iterative learning. I call this BAN for Bayesian analysis.
3. They could believe the future is driven primarily by human action which is intrinsically unpredictable and not susceptible to measurement (e.g. new fashions). In this case, their decision processes will consist of attempts to develop intuition (up-close and personal observation combined with induction) about relevant human agents and to build stakeholder partnerships and consensus among them with a view to controlling and shaping the future rather than trying to predict it. I call this EFF for effectuation.

Hence the null hypothesis:

Expert entrepreneurs engaged in developing new ventures exhibit no particular preference for any one of the three possible beliefs about (and techniques to deal with) the predictability of the future.

Alternatively, if the null hypothesis were to be rejected, subjects' preference for a particular belief about the predictability of the future may be analysed in terms of their decision processes.

2.2.5 Coding Scheme

The first set of data analysed pertained to the market research (MR) question – i.e. Question 4 of Problem 1: *How will you find out this information? What kind of market research will you do?*

First, I identified relevant semantic chunks for coding from the protocols of the MR question. A semantic chunk is the primary unit of analysis for hypothesis testing. A semantic chunk can range from a single phrase or sentence to a string of sentences that hang together to make a single meaningful point about the decision at hand. Secondly, an external coder and I independently coded the chunks. The external coder was an experienced cognitive scientist who did not participate in the study in any way except for this particular task.

The coding scheme we used is depicted in Table 2.3. The detailed categories in Table 2.3 were then integrated into three super-categories pertaining to the hypotheses as follows:

$$\begin{array}{lllll} \text{ANL} = & \text{AG} & + & \text{AN} & + \text{AB/AN} \\ \text{BAN} = & \text{MA} & + & \text{TM} & + \text{AB/TM} \\ \text{EFF} = & \text{GF} & + & \text{EF} & + \text{AB/GF} + \text{AB/EF} \end{array}$$

I disregarded PUB (published materials) on the assumption that everyone, regardless of their underlying beliefs about the future, would do some kind of secondary market research through readily available published sources either in a library or on the Internet. Only 16 semantic chunks were of this type. Coded chunks are quoted throughout the ensuing text. Subjects are numbered E1, E2 and so on and are parenthesized at the end of each quoted chunk for the reader's convenience.

The ANL category included statements suggesting the use of traditional market research methods such as focus groups and surveys and/or hiring professionals to conduct such market research. Examples of semantic chunks coded ANL include: 'I would also go to the market – like four or

Table 2.3 Coding scheme for the MR (market research) question

PUB = Published materials	Looking at existing published materials, library sources, internet, doing some secondary or perfunctory market research, etc.
AG = Agency	Hiring a market research company or some other agent to carry out the market research.
AN = Analysis	Using questionnaires and surveys – methods of finding out precise information that would lead to specific answers to analytical questions such as the size of the market, its growth rate with a view to calculating target market shares etc.
MA = Modified analysis	Suggesting AN but modifying with statements such as ‘one can never really know’ etc.
TM = Test marketing	Doing test marketing, trial ballooning etc. with a view to answer analytical questions such as mentioned above; doing iterative procedures of any kind such as focus studies, design development etc.
GF = Gut feel	Just talking to people and developing an intuitive feeling for what is going on in the market; or developing a deep belief about the market and the customer by immersing oneself in the market.
EF = Effectuation	Expressing disbelief in ‘traditional’ market research; emphasizing selling or implementing strategies even before doing any market research; developing strategies of ‘making things happen’ rather than merely discovering what is ‘out there’ – most common example of this is to look for a strategic partner or partners and/or networks first instead of doing market research; de-emphasizing planning and emphasizing ‘getting customers first.’
AB = Awareness of bias	Expressing concerns over the subject’s own biases. This awareness could be related to AN or TM or GF or EF.
AB/AN	For example, the subject might say ‘I don’t know the market, so I have to go out and observe it for myself’
AB/TM	(AB/GF) or ‘You cannot know what questions to ask, so you have to test things first’ (AB/TM). I suggest you code these as AB first and then make a judgment as to which of the above mentioned four categories it is related to. The ultimate coding should be either AB/AN or AB/TM or AB/GF or AB/EF.
AB/GF	
AB/EF	

five market research companies to find out whether they had done any research in this area' [E8]; 'I'd probably go to some of the business schools and I would use their internship programs to do the market research for me' [E17]; 'You would look at the global implications and see what the size of the market for your product would be' [E18]; 'I would want to do some market research relative to who I think my core customer groups are and what percentage are more likely to buy' [E28].

The BAN category included statements suggesting the use of systematic iterative learning methods such as test marketing and trial ballooning. Examples of semantic chunks coded BAN include: 'As far as the school boards, that would be a much more involved and difficult research project and almost seat of the pants' [E23]; 'I'd probably do some test marketing' [E7]; 'I'd probably search for an organization that does test market research' [E11]. Examples of semantic chunks coded as EFF are used throughout the next section reporting on the qualitative analysis of the data.

2.2.6 Quantitative Tests of the Null Hypothesis

Of the total of 235 semantic chunks from the MR question used for hypothesis testing, 24 (10 per cent) were coded ANL, 35 (15 per cent) were coded BAN and 176 (75 per cent) were EFF. The external coder found 9 [3 per cent] of the 235 chunks to be inapplicable to the question of how subjects would do market research. Four of these chunks came from one subject, E10. A total of 22 [9 per cent] mismatches were found between the two coders. This included the nine disputed chunks mentioned above. Inter-coder reliability was established through a Cohen's kappa of 0.90 significant at $p < 0.01$ (Bakeman and Gottman, 1986). A chi-square test with Yates correction ($\chi^2 = 99.62$; $p < 0.001$) provided strong evidence for rejecting the null hypothesis (Everitt, 1993). The contingency matrix is presented in Table 2.4.

A second test of the hypothesis provided additional rigor. Given the fact that different subjects had different total numbers of semantic chunks, this second test examined whether the more loquacious subjects were skewing the numbers in favor of the hypothesis. The test used the Borda count technique from the social choice literature (Saari, 1995). For each subject, the absolute numbers of chunks in the three categories were converted into relative magnitudes of 0s, 1s and 2s. This really is a rather extreme measure for if a subject such as E21 made no statement pertaining to ANL, one statement pertaining to BAN and nine statements of EFF, his Borda count would be 0 for ANL, 1 for BAN and only 2 (instead of 9) for EFF. The total Borda count for the sample as a whole came to 15 ANL; 20 BAN; and

Table 2.4 Contingency matrix for chi-square test (with Yates correction)

Subjects	ANL	BAN	EFF	Total
E1	0	0	12	12
E2	1	0	6	7
E3	2	2	6	10
E4	2	1	9	12
E5	0	0	10	10
E6	2	2	7	11
E7	0	5	9	14
E8	3	0	5	8
E10	1	3	0	4
E11	2	3	10	15
E12	2	0	4	6
E15	0	1	20	21
E16	0	0	3	3
E17	1	0	2	3
E18	0	0	9	9
E19	2	1	3	6
E20	1	0	10	11
E21	0	1	9	10
E22	0	5	5	10
E23	0	0	2	2
E24	0	1	5	6
E25	0	0	14	14
E26	0	1	11	12
E27	1	2	1	4
E28	4	1	1	6
E29	0	0	2	2
E30	0	6	1	7
Total	24	35	176	235

46 EFF. This means that even after removing the slightest possibility of relative loquacity there is an overwhelming preponderance of EFF statements – three times more than ANL and more than twice than BAN. This establishes the hypothesis (or at least demands our provisional acceptance of it) that in creating the market for a new product, subjects show a clear preference for heuristics other than traditional market research methods. In fact, more than 63 per cent of all the statements made by 74 per cent of the subjects (20 out of 27) were statements of effectuation; seven of the 27 did not make any statements other than in the EFF category. In the following qualitative analyses, I refer to these seven as *extreme effectuators*.

2.3 QUALITATIVE ANALYSES OF THE DATA: A PROCESS MODEL OF EFFECTUATION

Having discovered that only four out of 27 subjects used market research or any kind of predictive analysis to any meaningful extent, the focus of the analysis shifted to the task of identifying the specific process that the other 23 used instead. The contents of the protocols were analysed using simple process-tracing methods, such as those developed and used by researchers in cognitive science as a preliminary step to writing expert systems (Haines, 1974). This qualitative content analysis involved two stages. In the first stage, the coded chunks from the MR question were revisited with an eye to identifying specific suggestions made by the subjects that were an alternative to causal reasoning, grouping similar suggestions together into common categories and identifying and counting repeating patterns in the suggestions. A similar approach was used in the second stage of the qualitative analysis, except transcriptions from all five questions of Problem 1 were analysed, with the added step of first identifying all relevant semantic chunks pertaining to identifying the market for *Venturing*.

2.3.1 Six Inducted Elements from the Qualitative Analysis

In this section, I present the skeletal structure that emerged directly from the data, upon which I built the full-bodied effectual logic as described in the rest of the book. Two independent researchers, not including the external coder for the MR question, participated in developing the frequency counts used in support of each inducted element of the model. In describing the results of the analyses, a large number of original quotes from the protocols are presented in support of each frequency count used. These quotes not only support the decision model, but also reinforce the high-reliability quotients (over 90 per cent) among the researchers.

Element 1: starting with means rather than ends

The majority of subjects in the study started their decision-making process with a given set of means, rather than a predetermined goal. Three categories of ‘means’ emerged from the data. Subjects selected their first ‘customer’ based on any one or a combination of the three categories: (1) who they (the subjects) were; (2) what they knew; and (3) whom they knew. Initial customer selection based on who the subjects were included statements such as:

- ‘I’d rather sell to corporate America because I don’t like schools’ [E22];

- 'I'd rather be in the education business than in the game business' [E2]; and
- 'I am intrigued by games, I really am, I think it is an exciting area' [E3].

The second category of 'what they knew' had two sources for initial customer selection. Subjects in this category either used their previous work experience or used an analogy of something they had experienced in one way or another. Five subjects used other games (such as Monopoly, Mousetrap, Sim City, Civilization, etc.) as analogies and talked about either themselves or their kids enjoying computer games, and so making kids or well-to-do adults the first customers. Three had direct experience selling other types of toys and games or had been involved in educational software startups as potential investors. Under the third category of 'whom they knew', subjects selected a strategic partner as their first customer. Six subjects selected a business school professor they knew as their first customer. Even some of the subjects who selected their first customer from the earlier two categories suggested making partners of the first few. Extreme effectuators always began with partners. For example E26, quoted earlier, said:

Traditional market research says, you do very broad based information gathering, possibly using mailings. I wouldn't do that. I would literally, target, as I said initially, key companies who I would call flagship, do a frontal lobotomy on them . . . The challenge then is really to pick your partners, and package yourself early on before you have to put a lot of capital out.

Element 2: affordable loss rather than expected return

None of the 27 subjects tried to garner specific information about potential returns or to predict an ideal level of investment for their projects. Instead they wanted to spend only what they could afford to lose. Twenty-three of the 27 subjects (85 per cent) expressed concerns over money and insisted on trying not to spend any money in taking the product to market or to keep within the initial imaginary endowment of approximately \$30 000. The seven extreme effectuators did not want to spend any money at all. They wanted to take the product directly to market with zero resources spent on market research or other pre-selling activities.

Element 3: initial customers as partners and vice versa

Converting initial customers into partners was the preferred method of developing a segment definition. Another popular method was directly to sell to customers/partners at a very early stage. Seven subjects (the extreme effectuators) suggested selling even before the product was developed or produced. For example:

Somebody once told me the only thing you need is a customer and I think I'd start by just . . . going . . . instead of asking all the questions I'd go and say . . . try and make some sale. I'd make some . . . just judgments about where I was going – get me and my buddies – or I would go out and start selling. I'd learn a lot you know . . . which people . . . what were the obstacles . . . what were the questions . . . which prices work better and just DO it. Just try to take it out and sell it. Even before I have the machine. I'd just go try to sell it. Even before I started production. So my market research would actually be hands on actual selling. Hard work, but I think much better than trying to do market research. [E1]

Every product that potential customers are using, when critically examined, might give you insight on one aspect of your particular product. So you don't have to yourself go and do massive experiments. You can actually, by looking at half a dozen different products, you might actually learn about customer behavior, their need and their aspiration and . . . dynamics. So, without even going and building a product, you might want to get some understanding of the dynamics of that particular market that you're . . . since it doesn't exist, that's the best you can do. [E4]

Element 4: ignoring competition and stressing partnerships

In answering the question (Question 2) about who the customers for their new venture could be, the overwhelming response was to prefer creating the initial market segment *prior* to competitive analysis. Of the 27 subjects, 20 (74 per cent) either explicitly stated that they were not concerned with competitors or that competitors were irrelevant until you proved successful in building a target segment. Only seven (26 per cent) suggested that they even had questions about competitors and some of them mentioned in general that there are always competitors. Here is a sample of quotes from the protocols:

If you have a successful game . . . if it's popular . . . it will be copied by any one of a hundred different game players . . . [E1]

This field is nascent . . . there will be competition . . . but success factor is really less dependent on the competition. [E4]

At one time in our company, I ordered people not to think about competitors. Just do your job. Think only of your work. Now that isn't entirely possible, we do a lot of competitive research now. [E15]

So your competition is a secondary factor I think, you are putting the cart before the horse. [E19]

Overall, the data suggest that expert entrepreneurs overwhelmingly prefer to focus on building partnerships, instead of analysing the competitive landscape. Twenty-one out of the 27 subjects (78 per cent) selected a strategic partner as the first customer. Forty-four per cent (12 out of the 27)

stressed the importance of strategic partners over that of the customers. E25 put it very precisely:

I think that the way a company of the future makes money, is not in direct sales, it's in indirect sales. It's the ability in fact to license, to develop networks, who are not only distributors, who are not only users, licensees, but who may in fact be technology partners who for, in exchange for licenses in this product, will give me other products that I can move into. So frankly, the growth of the company is limited by the number of partners, as opposed to how many staff I have, or what my direct level of capitalization is. If in fact I can build a partnership network, I can leverage off balance sheet on their financial statements, and I don't have my own. Which is the challenge of the future anyway.

Element 5: fabricating rather than finding a market

The process for moving from a single customer or partner to a market consisted of two additional stages. The first consisted of adding segments either through the development of additional products for the initial segment or through stakeholder partnerships. The second involved defining a market through a strategic vision for the company. One particular protocol (that of E5 from Question 5 which asked him what the growth prospects for his new venture were) is presented in Appendix 2 in its entirety since it illustrates these last two stages spectacularly. Table 2.5 contains the process tracing based on this protocol, which is used along with data from Questions 1 and 4 to synthesize the complete process of effectuation used by E5.

E5 selected his initial customer through his previous experience. He had recently published a book and selected potential entrepreneurs or students of entrepreneurship (the readers of his book, in other words) as his first customers. Then, in Question 4, where he had to explain how he would do market research, he suggested understanding his first customer by going to his publisher: 'So the places I would go would be the first rocks I would turn over and I would undoubtedly find leads within leads in the places that I talked about.' If he were not in such a position, he would, he said, 'try to find a mentor who had written a successful business book, convince the mentor that this is a great product and get in that way.'

Having thus identified a customer-partner and defined a target customer segment in terms of current readers of books on entrepreneurship, he began Question 5 by stating he did not believe this product had great market potential. But he proceeded to consider specific aspects of both the product and the initial customer segment, defining both tentatively in terms of a theoretical single market as any learning in an interactive situation where simulation is a benefit. Gradually thereafter, adding new

Table 2.5 *Process tracing of E5's protocol on Question 5 of Problem 1*

Original protocol broken up into semantic chunks	Codes for semantic chunks
I don't think it could ever be a huge company	Initial perception of potential
The basic concept is a business simulator . . . startup simulator	First customer definition (he is referring to the first customer identified in question 1 and developed into a segment through 'gut feeling' in Question 4)
(After) successful launch of the first product (for potential entrepreneurs) with a big marketing sales push to penetrate as many different markets as we could . . .	
Might have a successful second product . . . For example, you could have a product which is how to succeed, prosper, grow and get promoted within a large company.	Adding segments
How do I graduate in the top 10% of your class at Stanford, or Harvard or Yale?	
We're really talking about any learning in an interactive situation where simulation is a benefit.	Beginning of market definition
Next there is negotiation . . . so . . . there is sales.	Adding segments continued
So I guess you could go on and on and then you could genericize the thing to any situation which requires some sort of technical knowledge . . . technical knowledge of negotiating . . . technical knowledge of bio-molecules . . . which also involves human organization . . . people you have to deal with . . . both outside the company to get them to help . . . to work with them and inside the company to get them to understand what is the company's methods objectives etc.	Market definition continued
So an organization in a learning situation with technical requirements	Market definition
And therefore you could see a several hundred million dollar company coming from it.	Change of mind of perceived potential

segments in an iterative process of refining and reformulating his original definitions, he ended up creating a market defined as any organization in a learning situation with technical requirements from which, in his own words, 'you could see a several hundred million dollar company coming from it.' Other subjects used other words but the pattern was repeated.

Element 6: unanticipated ends as opposed to the preselected goal

In all, starting with exactly the same imaginary product, the 27 entrepreneurs ended up creating 18 different market definitions as follows: licensing the product to a larger company [E6, E21, E28]; developing a series of high-tech games [E7, E26]; developing a series of computer/software products [E24]; developing a series of educational games (several variations on this theme such as games in different functional areas of business, etc.) [E17, E18, E20, E28]; developing corporate training and retraining programs of various kinds [E3]; developing tools for consultants [E25]; developing a series of educational services internationally [E15]; developing a series of indirect products of global interest [E25]; developing a series of computer simulation-based education materials and books including ones for become an ace student, an ace salesman, an ace negotiator, etc. [E5]; developing a family of products for business schools (whatever schools buy) [E3]; developing products for career decision support [E30]; developing products for the particular delivery vehicle/channel chosen [E3, E9]; continuously innovating with hands-on products for entrepreneurs [E11]; developing a seed company that participates in the growth of the companies built by *Venturing* customers [E4]; versions of *Venturing* for different types of schools [E2]; promoting entrepreneurship education internationally [E8, E16]; internet company such as CheckFree [E22]; sell products for school districts. [E23]

2.3.2 Putting It All Together: Causation and Effectuation

When put together as a process model, it became increasingly clear that the process emerging out of the data was an inversion of the causal reasoning that we teach students in entrepreneurship classes. Figure 2.1 graphically contrasts the effectuation process with the segmentation–targeting–positioning (STP) process used in mainstream marketing textbooks, clearly illustrating the reversal of the causal direction.

In the effectual model, the decision-maker does not start with a predetermined effect or a predefined market. Instead he or she begins by identifying a set of possible means as given (who the decision-maker is, what he/she knows and whom he/she knows), and then proceeds to create and choose among several possible effects in a contingent manner, continually fabricating and taking advantage of new opportunities. The evidence shows that effectuation is intrinsically path-dependent – especially stakeholder-dependent, rather than goal-driven or resource-dependent.

A comparison of the different stages of effectuation identified in the data with the stages involved in the STP process illustrates the causal inversion at the core of effectuation. In the textbook version, the process starts

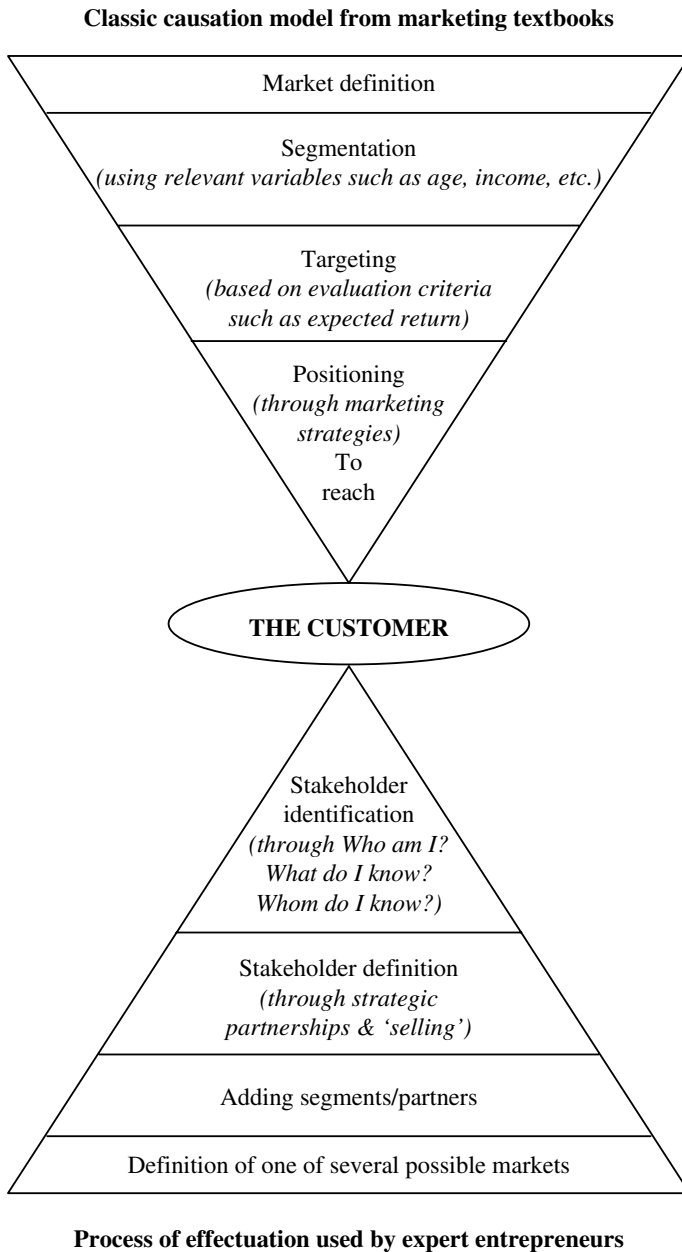


Figure 2.1 *Contrasting the textbook (causal) model of marketing with effectuation*

with a predefined market consisting of all possible customers for the product (Kotler, 1991). Information is gathered about this predefined market using techniques such as focus groups, surveys, etc. The market is then divided up into segments using relevant segmentation variables. Thereafter, based on a strategic evaluation of market revenue potential, one or a few particular segments are selected and targeted. Finally, on the basis of competitive analyses, the product is positioned within the target segment/s in an optimal manner subject to resource and technological constraints.

A decision-maker who uses the textbook model to create a market for *Venturing* would begin by considering a universe of all possible customers. This market would therefore be defined as all people who are computer literate and interested in either computer games or in learning about entrepreneurship or both. This predefined market would then be segmented based on variables such as age, spending power, previous purchases of computer games and/or entrepreneurship education, geographical location, etc. Information would be gathered about each of these segments and some evaluation criteria would be developed based on size, growth potential, risk–return profile, etc. One or more segments would then be selected as target segments with a view to maximizing potential return. Marketing strategies including distribution, pricing and promotion would be crafted and *Venturing* would be carefully positioned to capture the hearts and pockets of the individual customers in the target segment.

None of the subjects in this study, including the four who suggested using traditional market research techniques, actually used this top-down causal model for creating the market for *Venturing*.

2.4 AN INITIAL TEST OF THE MODEL

Once I had extracted the base model of effectuation from the data from Problem 1, I developed two sets of specific predictions, one based on the causal model and another driven by effectuation. I then used the contents of the protocols from Problem 2 to test which set of predictions was supported by the data.

In Problem 2, subjects were given market research data on *Venturing* and asked to make the following marketing decisions:

1. Which market segment/segments will you sell your product to? (Segment question)
2. How will you price your product? (Price question)

3. How will you sell to your selected market segment/segments? (Channel question)

Keep in mind that I carried out actual market research on Venturing in developing the research instrument. The research instrument, reproduced in this book as Appendix 1, has the complete text of Problem 2.

2.4.1 Causal and Effectual Predictions for Problem 2

Causal predictions

The paradigm based on causal reasoning suggests that the subjects will first select a target market segment on the basis of highest expected value of returns and then select appropriate channels to market to that segment. This translates into the following predictions for Problem 2:

1. *Segment*: The prediction for target segment choice is the adults segment because it is the largest segment, based both on total estimated units and total dollar size. This segment consists of a total estimated size of 30 million units amounting to \$4 billion. Considered in conjunction with the price decision, this segment has the highest expected value of returns.
2. *Price*: The adults segment also has the highest expected value in terms of unit price – at \$139.50. Therefore, the prediction for price would be the \$100–\$150 range.
3. *Channel*: Three out of the four channels (i.e. all except direct selling to schools) could be used to reach the adults segment. So, any or all of the three could serve as predictions for this question.

Effectual predictions

Effectuation suggests that the initial customer would be discovered through affordable loss (Element 2) and generalized into the definition of a market segment. This suggests that the subjects will first select a method of reaching potential customers – most probably the cheapest possible channel. Furthermore, fabrication rather than finding markets (Element 5) suggests that the initial selection will likely not be that of a segment; it will be the selection of a partner. Therefore, effectuation makes the following predictions for Problem 2:

1. *Segment*: The initial segment will depend upon the channel selected.
2. *Price*: Any one or all of the price ranges could be selected, based on the initial channel, initial customer–partner and the possible development of the stakeholder network.
3. *Channel*: The channel selected would be the cheapest channel – i.e. the internet.

2.4.2 Testing the Predictions: Evidence from the Protocols for Problem 2

Tables 2.6, 2.7 and 2.8 contain the counts of the different decisions that the subjects made in Problem 2.

The segment decision: Table 2.6

Only 26 per cent of the subjects selected the adults segment, rejecting the prediction based on the causal paradigm. In fact, 48 per cent selected no

Table 2.6 The segment decision: evidence from Problem 2

Segment	No. of subjects	Percentage
Adults	7	26
Contingent on channel or partner	13	48
Kids	5	19
Schools	1	4
Companies	1	4
Total	27	100

Table 2.7 The price decision: evidence from Problem 2

Unit price (\$)	No. of subjects	Percentage
< 50	3	11
50–100	10	37
101–150	4	15
151–200	3	11
201–250	3	11
Not applicable	4	15
Total	27	100

Table 2.8 The channel decision: evidence from Problem 2

Channel	No. of subjects	Percentage
Internet	12	44
Customer–partner	11	41
Cheap retail	2	7
Magazines	2	7
Total	27	100

segment at all – they merely selected a channel or a partner and assumed a segment would develop from that. Also, on the basis of who they were, what they knew and whom they knew, some subjects selected kids or schools or companies as their initial customers. Thus the evidence suggests that 74 per cent of the subjects used effectuation with regard to this question.

The price decision: Table 2.7

Only four of the 27 subjects (15 per cent) selected the price range of \$100–\$150, predicted by the current paradigm, strongly rejecting the idea that subjects would price the product at its maximum expected value. Instead, the subjects chose a variety of price ranges depending primarily on the initial channel or the initial partner. In fact, four of the subjects did not select any initial price at all, leaving it up to contingent events based on initial customer–partner selection. All used a rather experimental attitude toward pricing rather than an analytical or predictive calculation of any kind.

The channel decision: Table 2.8

The evidence here is clearly in favor of effectuation. Eighty-five per cent of the subjects selected either the Internet or a partner first. Even the remaining 15 per cent selected channels on the basis of their previous experience, and not due to selection of target segment. In most cases they explicitly stated that the reason for picking a particular channel was that it would be extremely cheap and easily accessible. None mentioned or suggested that the channel selection would depend on the selection of a target market segment. In fact, there was an overall emphasis on reaching the customer, any customer, rather than on selecting any particular segment.

In sum, none of the 27 subjects focused on calculating the optimal market segment as the primary method for making marketing decisions.

3. Interpreting what I found

In interpreting the results of the empirical analyses and drawing useful conclusions, we can use one of two philosophical approaches: a strict positivist stance, which seeks rigorous tests of the theory; or a more radical pragmatist rethinking of what we think we know about entrepreneurship. My empiricism, as I have earlier confessed, began more with Carnap than Popper, but my theoretical journey, as I shall elaborate here, became more pragmatist than positivist. This does not preclude ongoing empirical work from drawing upon both perspectives. Choice of perspective itself is a design decision for each project rather than an *a priori* ideology. This chapter discusses limitations and ongoing work from a positivist perspective before embarking upon a pragmatist interpretation of the results.

3.1 FROM A POSITIVIST PERSPECTIVE

The primary problem with the study from the point of view of positivist rigor is the lack of a control group. At the time of designing the original study, it was not clear what group to use. I considered three possible groups:

1. Unsuccessful entrepreneurs
2. Experts in areas other than entrepreneurship
3. Novice entrepreneurs.

3.1.1 Unsuccessful Entrepreneurs

Using unsuccessful entrepreneurs as a control group assumes that expertise guarantees or is congruent with success. As I explained in Chapter 1, this is simply untenable. Moreover, classifying entrepreneurs as successes and failures is a hazardous undertaking. Even classifying specific firms as successes or failures is not always an easy task. Entrepreneurs who have founded successful firms may later start ventures that fail. And vice versa. But rejecting the viability of unsuccessful entrepreneurs as a control group raises important issues with regard to expert entrepreneurial performance.

The identification of one or more factors that could be demonstrably and causally related to the success or failure of new ventures would of course

be a powerful bottom line for any study of entrepreneurship. In fact, empirical work in the field has almost exclusively chased that bottom line for more than two decades, without much avail. Given the weight of evidence (or the overwhelming lack thereof), it was both unwise and theoretically inappropriate to equate entrepreneurial expertise with firm success. Kenneth Arrow has forcefully argued for this view:

Are we trying to isolate a claim that some particular set of individuals with certain characteristics or particular set of institutions create – distinguish the successes and the failures? And this introduces me to what I call the null hypothesis: That there is no such thing. (Sarasvathy, 2000: 14)

Common sense suggests that there must be numerous ways of failing and succeeding that have nothing to do with what the expert entrepreneur knows how to do and does well. Anecdotal evidence abounds to attest to the failed firms founded by successful entrepreneurs and vice versa. Ranging from sheer luck and ‘acts of God’ such as wars and natural disasters, to new technology regimes and exogenous changes in regulatory policies to differences in initial endowments of resources and abilities – a wide variety of causes can lead to the failure or success of any given venture. Yet if entrepreneurial expertise does not increase the probability of success for the firm started by the expert entrepreneur, what would be the content and use of such expertise? I shall look very closely into this question in Chapter 6 when I relate effectuation to entrepreneurial performance.

But at the time of designing the original study, this question could not be answered, even in theory. Therefore I decided not to use unsuccessful entrepreneurs as a control group and instead approached the project as a matter of existence proof. In other words, the original study was designed to establish the existence (or not) of any commonalties at all across a variety of expert entrepreneurs – a baseline model of entrepreneurial expertise. The direct implication of this design decision was that I would not draw any conclusions at all about the relationship between entrepreneurial expertise and performance. Instead, if commonalties that formed the basis of a theory of entrepreneurial expertise were discovered, I would then very carefully hypothesize relationships for future testing. That is exactly what I shall do in Chapter 6.

3.1.2 Experts in Areas Other Than Entrepreneurship

It is obvious that expert entrepreneurs share both commonalties and differences with experts in other areas. The problem in using other experts as a control group, however, is in finding a meaningful group for comparison. In domains very distant in content from entrepreneurship (say, music or chess)

the differences could presumably be attributable to differences in domain; in domains close to entrepreneurship (say, general management or leadership), there is no compelling theoretical rationale to expect variation. Most CEOs have been founders and all expert entrepreneurs are also leaders. Furthermore, the subjects in my sample have a wide variety of technological and functional backgrounds. This was intended to isolate entrepreneurial from other types of expertise, but it precluded comparisons with experts in particular functional areas of management. Given the hypothesis from extant research that there was no such thing as entrepreneurial expertise, I decided to establish the existence proof before determining which group of experts outside entrepreneurship would constitute a meaningful comparison group.

At least in a straw-man sense, it has turned out on the basis of the results of the study that marketing professionals and strategic consultants might form a good comparison group. Certainly, the effectual model, as argued in the previous chapter, is a straight inversion of the causal model in Kotler's textbook. Two recent comparative studies – the first using think-aloud protocols to compare expert entrepreneurs with experienced managers in large corporations¹ (Read and Song, 2006) and a second one using interview data to compare them with a special group of managers who had successfully led organic top-line growth (Wiltbank and Liedtka, 2006) – provide interesting results. Whereas the general population of experienced managers differs significantly from expert entrepreneurs on every element of effectual logic, organic growth leaders appear to have a great deal in common with expert entrepreneurs on their use of non-predictive control.

3.1.3 Novice Entrepreneurs

The most logical comparison group is of course that of novices. There are two ways of doing a variance study comparing expert entrepreneurs with novices. One is to conduct it concurrently with the study of experts; the other is to create a base-line of expertise and then follow up with an expert–novice study. This has recently been accomplished in collaboration with Dew, Read and Wiltbank (2005). Results showed marked differences between the 27 experts and 37 novices. In quantitative terms, 89 per cent of experts preferred an effectual over causal logic, whereas 81 per cent of novices used causal rather than effectual approaches. Report of the study is currently under review. These results have also been independently replicated in Allen's (2003) unpublished dissertation.

After confirming that the two groups, experts and novices, differed in several elements related to entrepreneurial expertise, we combined all the significantly different items mentioned above to create a 'framing score' for each subject as follows: for each significant item, the subject received a 1 if

the response was associated with the overall expert response on that item (0 otherwise). For example, expertise was significantly associated with disbelief in the data. So each subject who expressed disbelief in the data received a 1; the rest received 0s. We found in the aggregate that the logical framing score separated out the subjects into two separate populations, as depicted in Figure 3.1.

I decided to use a follow-on rather than a concurrent design because my study was one of the very first to examine entrepreneurship through the lens of cognitive expertise. In fact, given prevailing estimates of high failure rates, there has been considerable skepticism (as articulated by Arrow above) about the very existence of any form of expertise in entrepreneurship. In other words, success is all that matters and entrepreneurial success is merely a statistical artifact. Differences within any group of so-called experts as well as those between experts and novices could be generated by the same underlying factors such as variations in risk propensities, differences in resources and so on. Anecdotal evidence on resources was equally ambivalent. Take for example the stories of Fedex and UPS: Fred Smith, founder of Fedex, was funded in the millions by his father to buy a controlling interest in Arkansas Aviation. UPS, on the other hand, was founded by Jim Casey, who borrowed \$100 from a friend. Given such disparate sources of variations within entrepreneurs in the same industry, and more than two decades of thwarted attempts to find any isolating factors that distinguish entrepreneurs from non-entrepreneurs, the pressing agenda for my study was to establish the mere existence of commonalties within a group of expert entrepreneurs.

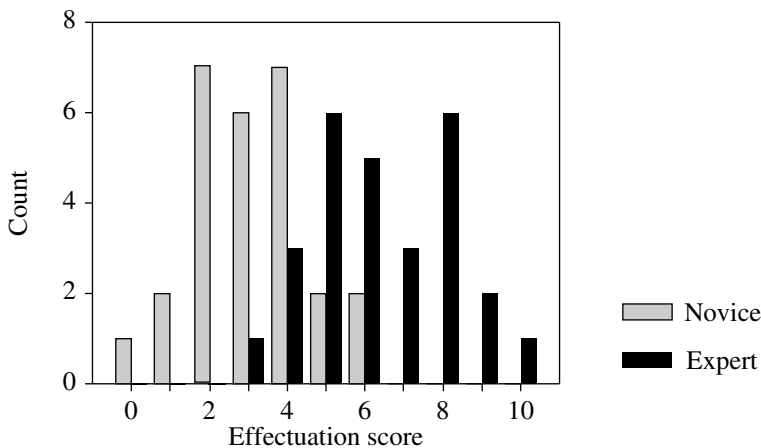


Figure 3.1 Expert–novice differences on logical framing scores

The argument for first focusing on isolating the phenomenon of entrepreneurial expertise was further strengthened by the confusion over what constitutes entrepreneurship. Unlike chess, or music, or accountancy, the very content of entrepreneurship has been unclear and therefore difficult for scholars to agree on. For example, could an expert accountant be a novice entrepreneur? Does an expert entrepreneur have to be an expert accountant? Although common sense suggests that an expert entrepreneur need not be an expert accountant, it could be argued both that entrepreneurial expertise requires a certain mastery of accounting, and that an expert accountant might have some advantages in certain types of entrepreneurship such as starting a tax software company.

3.1.4 Provisional Conclusions

Based simply on the first expert study that I have reported in detail in the previous chapter, we can draw the following provisional conclusions:

- Do expert entrepreneurs use effectuation at all? The answer to this is a clear yes.
- To what extent do expert entrepreneurs effectuate? I would conservatively conclude that a majority of them effectuate more than half the time, both in the number of decisions they make using effectual criteria, and in the number of stakeholder relationships they generate and sustain. More on the latter in Chapter 5.
- Does the use of effectuation depend on the stage in the life cycle of firms? I believe there are both life-cycle and contextual effects, both for the entrepreneur and the firms they build. I shall discuss this further in Chapter 6.
- Are expert entrepreneurs the only group of human beings who use effectual logic? My guess here is no. I suspect that there are several dimensions to effectuation. There may be a traits aspect – i.e. some people may have a natural preference for effectuation irrespective of the domain in which they are acting. Furthermore, effectuation is a general logic of action under Knightian uncertainty, and as such can be used in any domain in which outcomes are primarily driven by human action. But I also believe that entrepreneurship provides a unique environment that necessitates, reinforces and rewards an effectual logic. Finally, I believe effectuation is eminently teachable and learnable. I shall describe my classroom experiences and examine pending research projects related to pedagogy in Chapter 11.

In the next section, I briefly describe a subset of studies in progress since the completion of my original empirical investigation of entrepreneurial expertise. I also point to some possibilities in the immediate future.

3.2 FURTHER EVIDENCE

3.2.1 Independent Studies of Expertise Using Protocol Analysis

Besides the expert–novice studies mentioned above, at least two other studies of entrepreneurial expertise have been completed using the method of think-aloud verbal protocols. One has been published and the other is in press.

The Gustavsson dissertation

Veronica Gustavsson (2004) used three scenarios: an intuition-inducing task, a quasi-rationality inducing task, and an analysis-inducing task, to gather protocols from 55 subjects in three rounds of data collection. Subjects included both novices and experts. Novices had one to two years' experience and experts had no fewer than seven years' experience.

This study was not a direct test of causal versus effectual logics, but it did validate the usefulness of the expertise lens in studying entrepreneurship. For example, the main conclusion of the study was that experts recognized the differences in the tasks and matched their decision-making style to the cognitive aspects of the task. Novice entrepreneurs, however, did not exhibit such discernment. The study increases the reliability of the argument that there are teachable and learnable aspects to entrepreneurship. In other words, entrepreneurship does involve a core of expertise.

The Allen dissertation

In an unpublished dissertation Chuck Allen (2003), doctoral student at the University of Maryland, replicated my study by using the first two problems from my original research instrument. His subjects were largely novices, students in the MBA program at the University of Maryland. Even though all subjects in the study were students, they varied considerably in their entrepreneurial experience. The study used this variation to correlate experience with the use of causal and effectual logics. It also tested for a variety of relevant psychological variables using standard psychometric measures previously used in the traits literature in entrepreneurship. The results not only showed a strong correlation between the use of effectuation and experience, but also found most of the psychological measures uncorrelated with the variables of interest in the study.

3.2.2 Case Studies and Histories of New Firms and New Markets

Another way to examine the use of effectual logic in entrepreneurship is to analyse the early-stage histories of new firms and new markets. This can be done using case studies, real-time histories and longitudinal studies. The following are examples of research projects in this vein.

The RealNetworks case

The following is a summary of Sarasvathy and Kotha (2001).

In 1994, when the business world began recognizing the commercial potential of the Internet, the Web had no voice. To its users, the medium was effectively mute for several reasons. Audio clips at that time had to be completely downloaded before they could be played or heard. And a one-minute audio clip could take more than 10 minutes to download onto a computer before a user could attempt to hear it. Therefore, unlike text and graphical images, this up-front time investment made the use of audio untenable for most lay users. Using compression techniques and algorithms, RealNetworks pioneered the art of audio 'streaming' to overcome the limitation of downloading audio files on the internet.

Table 3.1 lists chronologically the key decision-events in the early history of RealNetworks, from its founding in early 1994 by Rob Glaser until the firm made its initial public offering (IPO) in September 1997. The earliest events before the official launch of its first product in April 1995 were garnered from a variety of histories of the company and several interviews with its founder, Rob Glaser. All decision-events between April 1995 and September 1997 are further evidenced in both the company's own press releases and in articles and commentaries from industry experts. Table 3.1 not only lists these decision-events in detail, but relates them to the principles, processes and overarching logic of effectuation.

Robert Reid, who has chronicled the early growth of the web and Rob Glaser's contributing role in its evolution, points out that Glaser was trying to think of a way to bring his technical and political interest together. He was toying with the idea of 'using interactive multimedia technology to create a . . . think of it as a cable channel focused on politics and culture' (Reid, 1997: 77). In fact, the company was called Progressive Networks through all of its early history until just before its IPO in September 1997, when the name was changed to RealNetworks.

At the very beginning (early 1994), Glaser had no idea what a market for real-time audio streaming on the web would look like, for the simple reason that such an industry did not exist. What did exist was an entrepreneur with liberal leanings, a love of radio since childhood, substantial expertise in technology gained from his work at Microsoft and a social network from

Table 3.1 Use of effectual principles in the RealNetworks case

Date	Decision/Event	Process trace of effectuation principles used
Early 1994	Rob gets the idea for using interactive multimedia to create a cable channel for politics and culture	Starting with means consisting of (1) who he is;
Leading up to April 1994	Encounters Mosaic and has an epiphany about bootstrap mechanisms	(2) what he knows; and,
April 1994	Calls a compression expert from his Microsoft days and realizes that video would have to wait and decides to focus on giving the Web voice	(3) whom he knows
April 1994 to April 1995	Found Progressive Networks with \$1 M of his own money	Affordable loss, not expected return
April 1995	Funding from friends and development of RealAudio	Whom he knows to increase affordable loss
	Launch of RealAudio garners media attention	Affordable loss to market and garnering feedback
	Launch of RealAudio: prices not locked down	Affordable loss to market and garnering feedback
	Launch of RealAudio: programming includes ABC News, Voice of America, National Public Radio, Seattle Mariners baseball games and, Radio Yesteryear	Partnerships
May 1995	Netscape starts shipping RealAudio as part of its browser software	Partnerships
August 1995	Customers – Starwave, Ziff Davis, ABC News	Expanding networks of stakeholder partnerships
September 1995	Seattle Mariners – New York Yankees game served up on ESPN using RealAudio	Leveraging contingencies to create a brand
September 1995	ABC uses RealAudio to broadcast the OJ Simpson trial	Leveraging contingencies to begin making the brand ubiquitous

Table 3.1 (continued)

Date	Decision/Event	Process trace of effectuation principles used
October 1995	RealAudio 2.0	Iterative loop of affordable loss and customer feedback
December 1995	Glaser receives email from FreeVu and induces the founders to join him – development of video streaming product begins	Leveraging contingencies – and thereby acquiring knowledge resources and more partnerships
January 1996	VRML and Javascript developed – RealAudio now becomes part of Web-authoring software for multimedia presentations	Leveraging contingencies – new market for both audio and video streaming emerges
February 1996	Progressive Networks pledges support for Netscape's LiveMedia framework – assuring compatibility of streaming audio and video with browser software	Stakeholder partnerships to control rather than predict the future
April 1996	RealAudio 2.0 introduced and Access Graphics selected as VAR channel	Expanding partnerships
April 1996	RealAudio 2.0 wins <i>Internet World Magazine's</i> top award	Leveraging contingencies to make the brand ubiquitous and attract more partnerships
April 1996	<i>National Geographic</i> goes online on CompuServe's network with RealAudio technology	More stakeholder partnerships
August 1996	Progressive Networks and House of Blues introduce LiveConcerts.com	Partnerships to make brand ubiquitous
September 1996	RealAudio goes retail – shrink-wrapped to store shelves	Partnership with Selective Record – still chasing ubiquity as market begins to coalesce and mature
September 1996	RealAudio 3.0 launched and Prodigy starts bundling it with its custom browser	Partnerships

October 1996	Progressive Networks and Netscape put together a coalition of 40 companies in endorsing a multimedia standard called RTSP (Real Time Streaming Protocol)	Logic of control, rather than prediction
October 1996	RealMedia – multimedia architecture with converters from other platforms	Logic of control, rather than prediction
February 1997	RealPlayer 4.0 – Audio and video combined	Iterative loop of affordable loss and customer feedback
February 1997	RealVideo 1.0 – partnerships with and endorsements from 50 entertainment, content and computer companies	Partnerships
July 1997	Microsoft acquires 10% non-voting stake	Partnerships
August 1997	Joint venture with MCI to launch Real Broadcast Network	Partnerships
September 1997	Change of name to RealNetworks and IPO	

that experience. In setting out to create a progressive channel on interactive cable, as John Swenson of *Information Week* records, Glaser volunteered for the Electronic Frontier Foundation, and encountered Mosaic, which inspired him to create the software that allowed streaming audio on the web.

Starting with this contingency, the company then grew through a variety of partnerships, some that were carefully cultivated and others that arose serendipitously. Its history provides compelling details of an effectual logic in creating a company that outlived the dot com boom and bust. For example, the company's target markets and the prices for its software changed at least 13 times during the 26-month period between April 1995 and June 1997. In most of these 13 new market segments, the company had not determined pricing when the segment first opened up. The company often gave the software away or set tentative prices that changed rapidly as the firm actually tried to sell the product and stitched together an ever-expanding network of partners. Over a period of 29 months, the company created at least 150 strategic partnerships.

The CarMax case

Harting used a case study method to explore the story of Circuit City's CarMax used-car retailing unit (Harting, 2004). The study covered the period from CarMax's origins as part of a long-range planning effort within Circuit City in 1991 through its founding in 1993 to its establishment as a viable firm in 1994. Through focused interviews with several members of the original corporate start-up team and senior Circuit City executives, Harting sought to discover which kind of reasoning – effectual or causal – managers employed during the period in which CarMax was conceived and created.

The coded data in the study resulted in 69 discrete decision elements of which 33 (48 per cent) were coded as causal and the remaining 36 (52 per cent) were coded as effectual reflecting essentially a 50/50 split overall. Figure 3.2, reproduced from the study, maps the coded occurrences of effectual and causal reasoning against the timeline of the case. Each bold letter in the figure represents a decision-event. The subcategories of the respective logics represented by each letter can be found in the legends. The upper half of the figure shows the instances of effectual logic and the bottom half shows the instances of causal reasoning.

The analysis in the study revealed a heavy emphasis on effectuation in the very early stages of the development of CarMax, with its use rapidly tapering off as goals became defined and the organization progressed toward its first sale. But the study also found a surprising lack of dominance of causal approaches at the far right of the timeline, after the first CarMax store had been opened. Based on the data, the study concluded as follows:

Mirror plot: instances of causal and effectual reasoning versus project phase

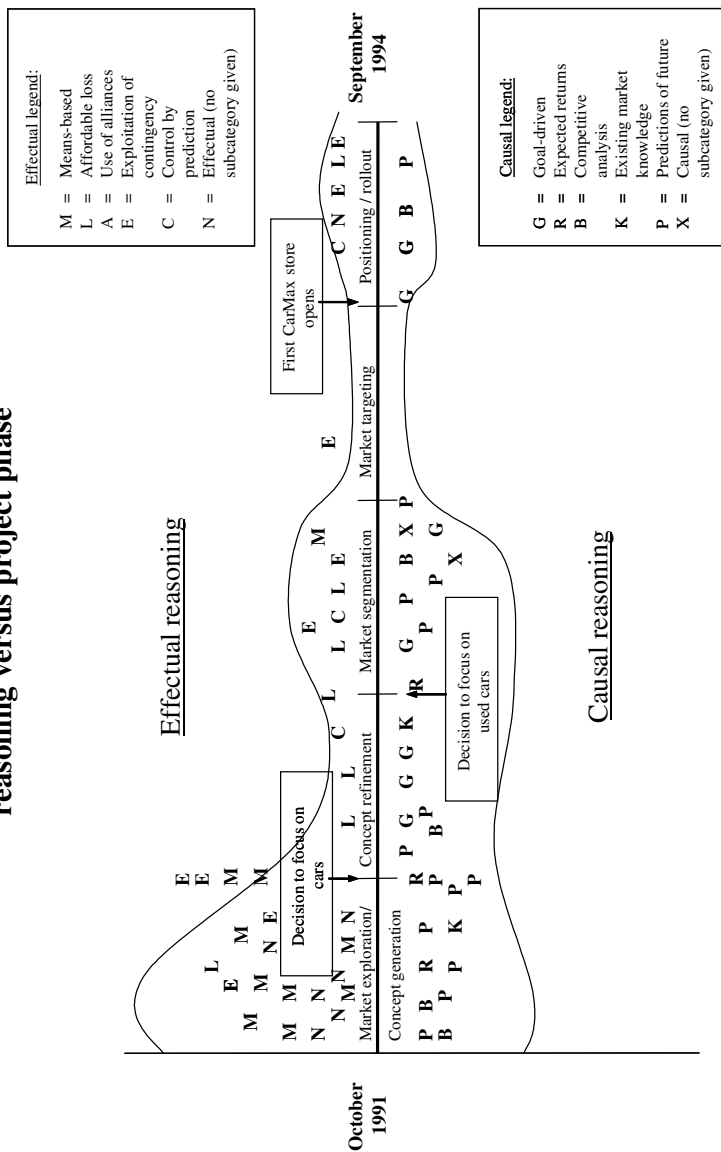


Figure 3.2 Use of causal versus effectual logics in the CarMax case

The above findings suggest that effectual decision-making is marbled in with causal decision-making in CarMax's case. Rather than the smooth evolution toward nearly pure causal thinking over time, we might envision a more nuanced approach to how these relative types of reasoning manifest in practice. For example, it may be that the organization's relative success in resolving uncertainty dictates how quickly a goal emerges to energize causal decision-making. Based on how well the initial use of effectual principles resolves the uncertainty from t_{-j} , further decisions at t may either take a causal flavor, or if uncertainty persists, continued effectual reasoning may be appropriate. Thus, it appears that even in a corporate setting effectuation can have a role to play in the process of opportunity search as companies seek ideas that will bring success, when said companies have little or no advantage in predicting the markets of an uncertain future over individual entrepreneurs. (Harting, 2004: 21)

Case study of Croatian Business School

Harmeling et al. (2004) traced the development in Croatia of a two-year MBA program focused on entrepreneurial innovation:

The story that forms the basis of this paper begins in 1991 when Serbian troops attacked the Croatian town of Osijek, after leveling Vukovar, only a few kilometers away. Dr. Slavica Singer stayed and witnessed the physical and emotional devastation the war had caused, particularly on the young people of Osijek, many of them her students at the University. She felt she had to do something, but she didn't know what it would be. She read and she thought, talked to lots of different people and gathered ideas. Nearly a decade later, Dr. Singer, a professor of economics at the University of Osijek, launched the Graduate Program for Entrepreneurship, a Western-style, two-year M.B.A. program focused on entrepreneurial innovation. (Harmeling et al., 2004: 216)

The study used personal experience and historical accounts to re-create the development of Singer's graduate program and to trace the use of causal and effectual logics over its development in five time-phases. It found that the venture developed initially through an effectual logic, and gradually incorporated more causal principles as it grew. Causal principles, however, were evident almost exclusively as goal-driven action and did not reflect an overall emphasis on predicting returns or analysing the competition. One reason for this could be that the setting is an educational institution rather than a mainstream for-profit venture.

The RFID Industry

Dew (2003) chronicled the real-time history of the new industry for Radio Frequency Identity tags. In a working paper (Dew, 2004), he also used an exemplar study each from sociological (Hargadon, 2003) and economic (Murmman et al., 2003a) approaches to industry formation and developed a dynamic model of effectuation that provided microfoundations for both

approaches. I discuss the model in Chapter 5 and Dew reports on his empirical work in Chapter 12.

In using three separate lenses to analyse the birth of an industry, Dew (2004) not only found evidence in support of all three, but also identified how the rich historical tapestry actually wove together the three views. In particular, he showed (a) that both sociological and economic approaches emphasize *variations*. Variations are crucial to evolutionary explanations that underlie both approaches. Dew also found (b) that both sociological and economic theories argue that change occurs through the *transformation* of extant realities rather than through creation of *de novo* entities from scratch. Finally, (c) since both approaches lack microfoundations for *how* these variations and transformations occur, he proposed effectuation as a useful lens in providing such microfoundations.

3.2.3 Surveys

Protocol analyses and case studies both predominately consist in qualitative research. But in using a positivist approach to understanding effectuation, a quantitative method may be required to cast a wider net for data collection. In pursuit of that goal, Stuart Read and Robert Wiltbank (with occasional input from Nicholas Dew and me) have developed a survey instrument whose architecture and possible uses I briefly summarize here.

A taxonomy of strategies: prediction versus control

As will be evident from the rest of this book, large-scale quantitative tests would be too coarse-grained to sort out the use of causal and effectual logics in entrepreneurship. Therefore the survey instrument seeks to pick out one coherent thread: the use of predictive versus non-predictive strategies. The taxonomy of possible strategies based on the *orthogonal* nature of strategic emphases on prediction and control, as depicted in Figure 3.3, forms the architecture of the survey instrument. This taxonomy has been explained in detail and explicitly connected to several important streams of research in strategic management in Wiltbank et al. (2006).

Deterministic frameworks in strategic management all share a basic premise: prediction is useful in strategy making because what can be predicted can be controlled. And when the environment changes rapidly and there is not enough time to predict, strategic management urges quick responses as a way of adapting to the changing environment. But there are circumstances, for example, when a firm has accumulated market power under which it can use predictive approaches to control its outcomes. Effectuation, of course, belongs in the bottom right-hand quadrant of

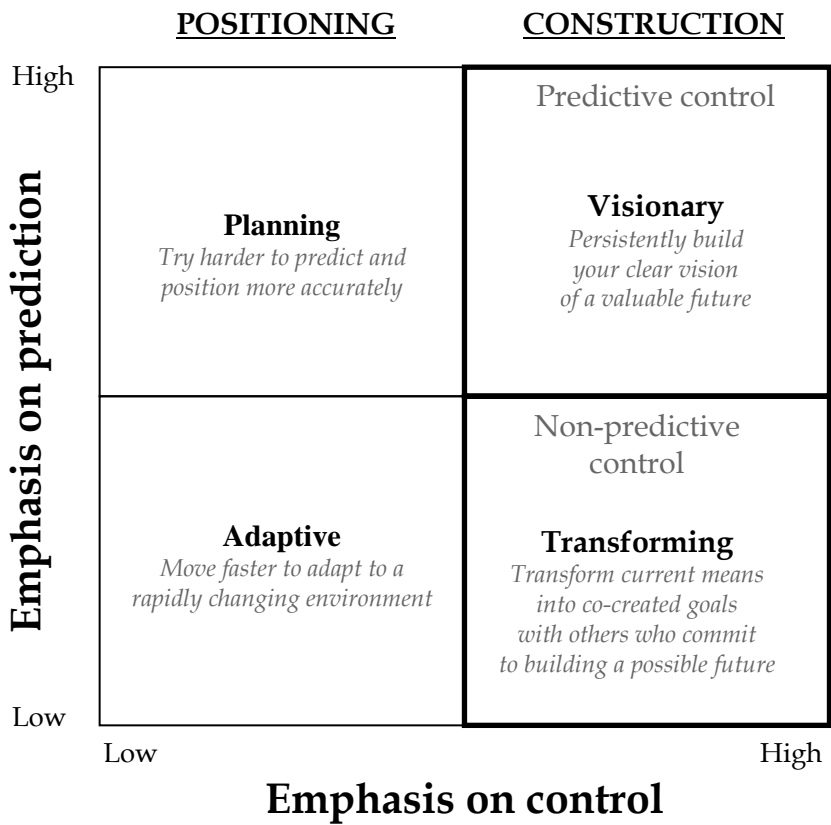


Figure 3.3 Predictive versus non-predictive strategies in the survey instrument

Figure 3.3, where non-predictive approaches are used to control and construct the firm’s environment and hence its outcomes.

The survey instrument uses four scenarios, one in each of the four quadrants, and a variety of strategic options in each scenario to test for relationships between logics used by decision-makers and the specific strategies they use under each scenario.

Prediction versus control in private equity investing

The survey instrument described above has also been modified to test the decision-making processes in entrepreneurial settings used by private equity investors such as angels and venture capitalists. The obvious hypothesis here is that angels are likely to be more effectual, emphasizing

the use of non-predictive control in their decision-making. Venture capitalists are likely to be more causal or focused on predictive approaches such as formal market research and calculations of expected return. In Chapter 12, Wiltbank reports on a completed study with analyses and results.

3.2.4 Laboratory Experiments

A natural offshoot of the survey instrument might be a laboratory experiment accompanied by simulations in the style of behavioral economics. Several design possibilities in this regard are currently being explored, but they are in too early a phase to discuss now. Instead, it may be useful to return to my original empirical journey.

3.3 FROM A PRAGMATIST PERSPECTIVE

In interpreting the results of the entrepreneurial expertise study, I had several paths to choose among. The positivist agenda of parceling out entrepreneurial performance in terms of variations in the use of causal and effectual logics was just one way to proceed. By a happy coincidence, I discovered the late-19th-century philosopher and psychologist William James and his growing circle of more recent comrades-in-arms. James led me to see the ‘So what?’ question in a whole new light.

Pragmatism is inspiring an increasing amount of interest and debate in recent scholarship in the social sciences. Although it has been around since the beginning of the 20th century, it has seen a revival in recent times owing to the works of philosophers such as Rorty, Goodman, Davidson and others. Here I would like to outline pragmatism as it applies to effectual entrepreneurship.

Like Richard Posner, I believe:

[t]here is no canonical concept of pragmatism. I mean, to begin with, an approach that is practical and instrumental rather than essentialist – interested in what works and what is useful rather than in what ‘really’ is. It is therefore forward-looking, valuing continuity with the past only so far as such continuity can help us cope with the problems of the present and of the future.

Emphasizing the practical, the forward-looking, and the consequential, the pragmatist, or at least my kind of pragmatist (for we shall see that pragmatism comes in an anti-empirical, antiscientific version) is empirical. (Posner, 1995: 4)

The ‘practical and instrumental’ nature of pragmatism draws attention away from questions such as ‘Do expert entrepreneurs *really* use

effectuation?’ to questions such as ‘Why would anyone want to use effectuation? What difference does it make whether expert entrepreneurs use an effectual logic or not?’ As James explained it, pragmatism uses a different touchstone than truth as correspondence-to-reality. It rejects the notion of one Truth and the consequent dichotomization of the world into True and False. Instead, it seeks to pit truths against truths in terms of their consequences for the way we live in the world and interact with one another. As James (1907) says:

The pragmatic method in such cases is to try to interpret each notion by tracing its respective practical consequences. What difference would it practically make to anyone if this notion rather than that notion were true? If no practical difference whatever can be traced, then the alternatives mean practically the same thing, and all dispute is idle. Whenever a dispute is serious, we ought to be able to show some practical difference that must follow from one side or the other’s being right . . .

Ostwald in a published lecture gives this example of what he means. Chemists have long wrangled over the inner constitution of certain bodies called ‘tautomers.’ Their properties seemed equally consistent with the notion that an instable hydrogen atom oscillates inside of them, or that they are instable mixtures of two bodies. Controversy raged; but never was decided. ‘It would never have begun,’ says Ostwald, ‘if the combatants had asked themselves what particular experimental fact could have been made different by one or the other view being correct. For it would then have appeared that no difference of fact could possibly ensue; and the quarrel was as unreal as if, theorizing in primitive times about the raising of dough by yeast, one party should have invoked a “brownie,” while another insisted on an “elf” as the true cause of the phenomenon.’ (James, 1907: 19)

In terms of effectuation, I began asking myself: what particular facts about entrepreneurship would be materially different if we assumed expert entrepreneurs effectuate versus if we do not? What does effectuation tell us about entrepreneurship that we did not already know? What new questions does it allow us to ask? What new research projects does it suggest that have not been envisioned earlier? How would students’ experiences learning about entrepreneurship be different if we taught them the principles of effectuation than if we did not? In other words, what is the cash value of effectuation?

A variety of current literature relevant to entrepreneurship, read from a pragmatist perspective, also helped me rethink and build upon what we thought we knew instead of trying to merely accept or reject hypotheses. Almost immediately, an incessant flood of new research possibilities began to suggest itself. This flood derived its force from a series of very fertile inversions of many cherished premises in entrepreneurship, management and economics research. Here is just a trickle to sample:

Premise 1: The existence of certain traits makes an entrepreneur. Or, the existence of certain circumstances makes an entrepreneur. *Inversion:* Certain types of action make an entrepreneur. *Consequence:* Anyone can act entrepreneurially – it is a matter of choice, or a ‘live option’, as James might put it, rather than a natural tendency, a circumstantial necessity or a social imperative.

Premise 2: In a world in which opportunities abound, entrepreneurs will arise to take advantage of them. So policy makers should think in terms of creating opportunities and potential entrepreneurs should seek to discover them. *Inversion:* In a world in which people act entrepreneurially, new opportunities to create and exploit value will come to be. Opportunities are an outcome of entrepreneurship – entrepreneurship is not an outcome of opportunities. *Consequence:* Instead of incentivizing entrepreneurs by providing resources to pursue targeted opportunities, we may need to ensure freedoms necessary for people to act entrepreneurially and educate them in the entrepreneurial method to create new opportunities as they see fit.

Premise 3: ‘How do I become a successful entrepreneur?’ is a highly salient research question. *Inversion:* ‘How do I become a successful entrepreneur?’ is the wrong question. More salient questions would include: Given who I am and who I may or may not want to be, what kind of an entrepreneur can I become? Given the circumstances I find myself in, what kinds of entrepreneurial activities can I engage in? What kind of enterprises can I found and bring to fruition? *Consequence:* Our research efforts would be focused on developing taxonomies of entrepreneurs, environments and enterprises, and the logics of causal linkages between them, rather than chasing the holy grail of necessary and sufficient conditions for success that hold across individual identities, domains and artifacts.

Premise 4: Entrepreneurs are important inputs into firm performance. Entrepreneurs, therefore, should seek to avoid firm failure and to achieve predetermined metrics of firm performance such as survival, size, growth rate and profitability. *Inversion:* Firms are one way for entrepreneurs to achieve their aspirations. In other words, an instrumental view of the entrepreneur gets replaced by an instrumental view of the firm. *Consequence:* Firm failure can be an important input in entrepreneurial success; further, firm failures may actually contribute to productive novelty in the economy.

It became increasingly clear to me that a pragmatist approach, leading to the development of effectuation as a *logic* of entrepreneurial action rather than a *theory* of how entrepreneurs do (descriptive) or should (normative) act, offered possibilities that were hard to resist. By *logic*, I mean

an internally consistent set of ideas that form a clear basis for action upon the world. A *theory* is a statement about the truth or otherwise of a phenomenon in the world.

In the rest of the book, I shall carefully think through effectuation as a pragmatist logic for acting upon the world rather than as a positivist theory to be tested and proved true or false.

NOTE

1. We used the first two problems from the research instrument provided in Appendix 1.

PART II

The theoretical journey – effectuation

4. Understanding effectuation: problem space and solution principles

The contrasting metaphors of a patchwork quilt and a jigsaw puzzle capture the difference between an effectual and a causal logic of action. The prevailing myth of the entrepreneur is that of a visionary who is able to see farther into the future than the average person, who solves the complex jigsaw puzzle of a profitable opportunity more quickly and efficiently than others, bringing together financial resources, key people and capabilities that create a large and sustainable competitive advantage. But the problem with the jigsaw puzzle metaphor is that the picture – the market opportunity – already exists, so entrepreneurship is primarily a task of discovery. The expert entrepreneurs in the study, irrespective of whether they saw themselves as visionaries or not, did not in the actual experiment behave as though the picture existed and was just waiting to be put together. Instead, they proceeded rather like an accomplished quilter making a patchwork quilt.

Making a patchwork quilt differs from solving a jigsaw puzzle in at least three ways.

1. The quilter has wider latitude than the puzzle solver in putting together the pattern. Even when she begins with a basket of random patches, she can choose which patches to use and juxtapose them in a way that she personally finds pleasing and meaningful.
2. Large quilting projects are usually communal: a good quilter works with others who bring their own baskets of patches along with their tastes and talents. In the process, the quilter must decide who she will work with and why, manage various problems of coordination and deal with unexpected contingencies.
3. The quilt not only has to be pleasing and meaningful, but also has to be useful and valuable – ultimately, it has to keep human bodies warm or embody their aesthetics, as the zari quilt on the cover of this book does.

An effectual logic for building a new firm or a new organization or any type of collaborative institution incorporates similar subjective, intersubjective and objective elements that make it more analogous to stitching

together a patchwork quilt than solving a jigsaw puzzle. The quilt metaphor will help anchor the discussion as we examine the theoretical structure of the effectual problem space and the static and dynamic aspects of its solution logic in the rest of this chapter and the next.

4.1 THE EFFECTUAL PROBLEM SPACE

‘Rational choice involves two guesses’, wrote March (1978) in *RAND Journal of Economics* ‘a guess about uncertain future consequences, and a guess about uncertain future preferences’. The first guess – the problem of Knightian uncertainty – was discussed in detail in Chapter 2 as part of hypothesis development for analysing the think-aloud protocols from expert entrepreneurs. We shall discuss the second guess – the problem of goal ambiguity – later in this chapter. For now, it suffices to say that both Knightian uncertainty and goal ambiguity are essential aspects of the effectual problem space. But there is a third aspect – *environmental isotropy* – that needs further elaboration.

Given the unpredictability of the future and in the absence of clear goals, one explanation that has been proposed for the creation of successful innovative firms is through natural selection, the action of the independent environment in selecting among random variations in the behaviors of firms (Nelson and Winter, 1982). But the existence of an independent selection mechanism such as the market has also been questioned by a variety of scholars, including Weick (1979). These three elements constitute the problem space for effectuation:

Where do we find rationality when the environment does not independently influence outcomes or even rules of the game (Weick, 1979), the future is truly unpredictable (Knight, 1921), and the decision maker is unsure of his/her own preferences (March, 1982)? (Sarasvathy and Simon, 2000: 4)

4.1.1 The Problem Space for Starbucks

Take the case of Starbucks. If we used some of the prevailing theoretical lenses to analyse the origins of Starbucks, we would tell a story somewhat like the one Koehn (2001) tells:

- Howard Schultz built Starbucks into a nationally known brand name. How did he do that?
- First, he recognized that baby boomers were rejecting processed and pre-packaged foods in favor of more ‘natural’ and higher-quality foods and beverages.

- Secondly, he saw that Americans were becoming more interested in a higher level of service than was generally available in most retail outlets.
- Schultz used this understanding of the changing demand side – in tandem with a range of operating policies – to develop premium coffee products and appealing retail environments.

However, Koehn's own narrative, as she reports the details of the case, suggests a more complex reality than a visionary entrepreneur who recognizes a great opportunity and exploits it with ruthless efficiency. Instead, consider the following details from her report:

- By the 1980s, per capita coffee consumption in the USA, which was based largely on supermarket sales of one-pound cans from Maxwell House and other mass marketers, had been declining for 20 years.
- The original Starbucks was founded in 1971 by Gordon Bowker, Jerry Baldwin and Zev Siegl. It consisted of a shop in Seattle's Pike Place Market that sold high-quality roasted beans, along with tea, spices and supplies; it did not sell coffee by the cup.
- As Schultz himself states, 'But the founders of Starbucks were not studying market trends. They were filling a need – their own need – for quality coffee' (Schultz and Yang, 1997: 32).
- Even Bowker and his partners were not the first to 'discover' the specialty coffee market – Alfred Peet, the Dutch coffee connoisseur, had been at it since 1966. And it appears likely there may have been others before him.
- Schultz, unlike Peet or the original founders of Starbucks, was not a coffee aficionado. 'Like most Americans in the early 1980s, he had grown up thinking of coffee as a commodity purchased along the inner aisles of supermarkets' (Koehn, 2001: 219). He was an executive with the housewares supplier, Hammerplast, whose clients included the original Starbucks company.

As we look into the facts of the Starbucks story, how can we theoretically understand the development of the specialty coffee market, or the creation of Starbucks as we know it today, in terms of current theories such as opportunity recognition, institutional entrepreneurship, or evolutionary/co-evolutionary processes? More importantly, how can we understand the microfoundations – i.e. the decisions and actions at the entrepreneurial level – that drive processes of firm and market creation?

Current explanations at the micro level based on rational choice offer an inescapable dichotomy. Either individuals act rationally – i.e. they have

well-ordered preferences that enable them to choose between clear alternatives that can be evaluated on the basis of reasonably reliable information about the potential market. Or they behave irrationally, or idiosyncratically, creating random variations, subject to subsequent selection by largely exogenous market forces. A third category consisting of ‘deviations from rationality’ ranges over a wide spectrum of possibilities including heuristics, intuitions and emotions, but does not offer a comprehensive alternate frame. I shall explore and incorporate these where relevant as I explicate effectuation further. For clarity of exposition, I will deal with the rational–irrational dichotomy first.

Was there, or was there not, a market for Starbucks, irrespective of Schultz’s actions? Taking into account the data available in 1981, could he rationally have predicted this market? If not, did he merely act irrationally, or randomly, stumbling upon a market someone would eventually have discovered anyway? Theoreticians could argue either way. For example, we could argue that Schultz could not have acted rationally, because he could not have predicted a market where people would pay exorbitant prices for coffee. Here are data to support that:

During the next two decades [1960s and 1970s], the large roasters continued to spend huge advertising budgets fighting for shares in a shrinking market. Per capita coffee consumption began to fall in the mid-1960s, declining from a postwar peak of 3.1 cups per day in 1963 to less than 2 cups in the mid-1980s. Americans, especially teenagers who had historically drunk coffee, increasingly consumed other beverages, especially soft drinks such as Coke and Pepsi. By the late 1980s, about half the US population over the age of ten did not consume coffee. Long the nation’s number one beverage (excluding tap water), coffee had dropped to a distant second behind soft drinks. (Koehn, 2001: 213)

At the same time, other data could be used to argue that Schultz did not act irrationally or randomly. Consider how he built his first coffee bar *Il Giornale*, which was later merged with the original Starbucks in 1987:

The entrepreneur and his team listened carefully to patrons and each other in the months after *Il Giornale* opened. Consumers, they discovered, did not like nonstop opera music. Those interested in lingering in the store desired chairs. Some asked for flavored coffee. A menu printed primarily in Italian was not accessible to many people. The baristas’ bow ties were uncomfortable to wear and difficult to keep looking neat after hours in from of the espresso machine.

Schultz considered each of these issues. He wanted to please consumers. But he had to do so in a way that was consistent with the offerings and distinct identity that he was trying to create. He adjusted many operating policies in response to customer and employee feedback. *Il Giornale* began providing chairs and playing more varied music. The baristas stopped wearing ties. ‘We fixed a lot of mistakes,’ Schultz said. But he decided not to honor some requests. For example,

although the larger market for vanilla, hazelnut, and other artificially flavored beans were growing rapidly, the company consistently refused to sell coffee brewed from them. Schultz believed the practice would compromise his organization's commitment to selling an authentic, high-quality product and thus its brand's developing image. (Koehn, 2001: 213)

In fact, the story of Starbucks, like the story of many enterprises, is full of feedback from the so-called 'market' that, from an *ex ante* perspective, may or may not be useful or wise. Christensen (1997) has chronicled several recent cases in point, where feedback from customers led to the failure of leading firms opening up new markets that the same customers eventually migrated to (Christensen, 1997). The confusion inherent in the information available to Schultz does not consist only in the profusion of market feedback. It extends to feedback from other stakeholders, including investors, employees and strategic partners. For example, while the founders of the original Starbucks would not agree to convert their enterprise into an Italian-style coffee bar business, they did offer Schultz seed money and advice to found *Il Giornale*. Similarly, of the 242 men and women he approached for funding, 217 decided not to fund the venture, but the others did purchase equity. The weight of the evidence was against him – yet there was enough support to indicate that his actions were not random or irrational.

If we take the third perspective based on heuristic or other types of deviations from rationality, we are left with a plethora of possible actions without consistent criteria on the basis of which to choose our course. It is an empirical fact that people choose based on criteria other than those provided by normative rationality. But it is also a fact that they do not have a logic on the basis of which to choose among the various non-rational tools available to them. Schultz, therefore, had as much reason to take the plunge into the venture as not. And that exactly is the problem of isotropy.

4.1.2 Isotropy

So the question is not whether an entrepreneur acts rationally or not, but how can an entrepreneur act rationally in the face of multidimensional uncertainties? Specifically, what does it mean to 'act rationally' in cases where the information is isotropic?

Isotropy refers to the fact that in decisions and actions involving uncertain future consequences it is not always clear *ex ante* which pieces of information are worth paying attention to and which not. The problem has been studied by cognitive scientists, roboticists and philosophers of mind. The *Stanford Encyclopedia of Philosophy* quotes Fodor's definition of the problem as follows:

For the difficulty now is one of determining what is and isn't relevant. Fodor's claim is that when it comes to circumscribing the consequences of an action, just as in the business of theory confirmation in science, anything could be relevant (Fodor, 1983). There are no a priori limits to the properties of the ongoing situation that might come into play.

Weick's (1979) thesis that organizational actors enact their environment and retrospectively make sense of their equivocal enactments assumes isotropic environments – even though Weick does not formulate his thesis in terms of the isotropy problem. He is interested in the reverse problem. While Fodor would argue that it is not clear *ex ante* what we should pay attention to because the environment is isotropic, Weick's argument that what organizational actors pay attention to helps enact their environments suggests that human action generates isotropy in the environment. *Theoretically* speaking (*à la* Weick), in such cases, you cannot just leave it to the environment to select among variations created by actors:

What the decision makers attend to and enact, the cues they use, why they use those cues, their patterns of inattention, and their processes for scanning and monitoring all become more influential as sources of selection criteria. Reality as perceived by the members becomes more the source of selection within the organization than does reality as perceived by some omniscient, less involved observer.

At the same time, *practically* speaking (*à la* Fodor), actors cannot know what to attend to and what to ignore. One might as well let out a respectful whistle and exclaim as Yossarian (Heller, 1961) did:

'That's some catch, that Catch-22', he observed.
'It's the best there is', Doc Daneeka agreed.

4.1.3 Three Elements of the Effectual Problem Space

In sum, three elements constitute the effectual problem space:

1. Knightian uncertainty – it is impossible to calculate probabilities for future consequences.
2. Goal ambiguity – preferences are neither given nor well ordered.
3. Isotropy – it is not clear what elements of the environment to pay attention to and what to ignore.

Let us go back to the case of Starbucks and re-examine Schultz's decisions and actions in terms of these three elements.

1. How could he calculate the probabilities for the outcomes of his actions?
2. Did he really know what he wanted to achieve? If so, were his goals clear?
3. How could he know which elements of feedback from customers and others to pay attention to and which to ignore?

I have already presented facts from the case to show that points 1 and 3 were real problems in his case. Let us now examine point 2. In many places, both in Koehn's exposition and Schultz's own words, Schultz comes across as the quintessential visionary – someone who knew exactly what he wanted, had the vision to perceive the enormous opportunity Starbucks offered and went after it and made it happen. But even if we accept as fact that from day one he 'saw' an opportunity and clearly wanted to build a national business of some sort, it still was not clear whether the business would be a chain of retail stores that sells specialty coffee, or coffee-houses in the restaurant model, or something in between for which there were no clear models. The list of isotropic problems goes on and morphs into problems of goal setting. Should he build the business as a franchise or not? Should he retain the name *Il Giornale*? And the farther we go back into the origins of the enterprise, seeking to fit the story with current theories about opportunity recognition or 'discovery' processes, the more uncertain, ambiguous and isotropic the problem space appears.

Schultz's own description of his initial decision to leave Hammerplast and go to work for the original Starbucks evokes more a Marchian tapestry – a throng of preferences and passions jostling on the mental trading floor – than a well-ordered army marching to the command of goal clarity:

On the five-hour plane trip back to New York the next day, I couldn't stop thinking about Starbucks. It was like a shining jewel. I took one sip of the watery airline coffee and pushed it away. Reaching into my briefcase, I pulled out the bag of Sumatra beans, opened the top, and sniffed. I leaned back, and my mind started wandering.

I believe in destiny. In Yiddish, they call it *bashert*. At that moment, flying 35,000 feet above the earth, I could feel the tug of Starbucks. There was something about it, a passion and authenticity I had never experienced in business.

Maybe, just maybe, I could be part of that magic. Maybe I could help it grow. How would it feel to build a business, as Jerry and Gordon were doing? How would it feel to own equity, not just collect a paycheck? What could I bring to Starbucks that could make it even better than it was? The opportunities seemed as wide open as the land I was flying over. (Schultz and Yang, 1997: 36–7)

The story he tells is, of course, subject to retrospective bias. It may or may not be apocryphal. But the fact remains that he did quit Hammerplast and

joined Starbucks. And if his vision was in fact any less clear than he reports, that would only strengthen my argument about goal ambiguity. If it had been any more clear, there is no reason why he would not report it that way – he appears to have no problem asserting his vision in other places.

It is also important to note that Starbucks, ultimately, is a success story. As a result, there is a tendency both for the subject involved, Schultz, and the scholars reporting on him to retrospectively describe his actions as prescient, resolute and discerning. Had he failed in his venture, we would be tempted to describe those same actions as reckless, stubborn and foolish. And that is exactly the problem *ex ante* – both for effectuators and for those of us studying them.

Do expert entrepreneurs impose their will and vision on the world, subject to environmental constraints? Do sociological ‘fields’ determine what they want? Or, as Giddens (1984) and others might argue, is it a matter of ‘reflexive structuration’? Equivalently, in Lewin and Volberda’s (1999) language, is it co-evolution of some sort? On the one hand, there appears to be more room for the individual will to act than either some sociologists (*There are no green fields* argument) or psychologists (*There is no such thing as ‘will’* argument) would allow. On the other hand, there seems to be less of a role for well-ordered preferences than some economists would like. Yet theories such as structuration or co-evolution, although valid at a higher level of analysis, simply do not tell the troops what to do on the ground.

For example, what advice can we give people faced with a problem space characterized by Knightian uncertainty, goal ambiguity and isotropy? Irrespective of the efficacy of higher-level theories about innovation, opportunity recognition and so on, all we can tell them at the micro-level is to take their best guess about future events, have faith in their vision or trust their intuition to persist with the opportunity they perceive, and build charismatic leadership skills that enable them to persuade others to join them and follow through to eventual success.

But is this truly the best we can do? The actual cognitive processes used by the expert entrepreneurs I studied suggest there could be a way to act within the effectual problem space that is neither ‘rational’ in the traditional sense nor a ‘deviation’ from rational behavior. In fact, the data suggest that talking about rationality in a monistic way sets up a false dichotomy consisting in rationality and irrationality (or deviations from rationality). Even a distribution bridging the two tails of rationality and irrationality huddles around a single axis.

What we need is a way to pluralize the concept of rationality. One way to do that is to develop key elements of a logic that directly grapples with Knightian uncertainty, goal ambiguity and environmental isotropy. It is clear that such a logic has to be:

- non-predictive – i.e. not taking the event space for probabilities as given and immutable;
- non-teleological – i.e. not taking preferences and goals as pre-existent or unchangeable; and,
- non-adaptive – i.e. not taking the environment as exogenous or as something to respond to and ‘fit’ with.

Such a logic is a logic of design and not one of choice.

4.2 PRINCIPLES OF EFFECTUATION – CRITERIA FOR TAKING ACTION

Causal problems are problems of decision; effectual problems are problems of design. Causal logics help us choose; effectual logics help us construct. Causal strategies are useful when the future is predictable, goals are clear and the environment is independent of our actions; effectual strategies are useful when the future is unpredictable, goals are unclear and the environment is driven by human action. The causal actor begins with an effect he wants to create and asks, ‘What should I do to achieve this particular effect?’ The effectuator begins with her means and asks, ‘What can I do with these means?’ And then again, ‘What else can I do with them?’

We are familiar with causal logics. We routinely use them in MBA classrooms. The make-versus-buy decision in production, or choosing the target market with the highest potential return in marketing, or picking a portfolio with the lowest risk in finance, or even hiring the best person for the job in human resources management are all examples of problems of causal reasoning. A more interesting variation of causal reasoning involves the creation of additional alternatives to achieve the given goal. This form of creative causal reasoning is often used in strategic thinking. Causal reasoning may or may not involve creative thinking, but effectual reasoning is inherently creative.

Effectuation, as stated earlier, does not begin with a specific goal. Instead, it begins with a given set of means and allows goals to emerge contingently over time from the varied imaginations and diverse aspirations of the founders and the people with whom they interact. Whereas causal actors are like great generals seeking to conquer fertile lands (think of Genghis Khan conquering two-thirds of the known world), effectuators are like explorers setting out on voyages into uncharted waters (think of Columbus discovering the New World that he did not know existed).

It is important to point out, however, that the same person can use both causal and effectual reasoning at different times depending on what the

circumstances call for. In fact, expert entrepreneurs are capable of both and do use both modes well (Gustafsson, 2004). But as the expertise data showed, they prefer effectual action to causal reasoning in the early stages of a new venture, and arguably, most entrepreneurs do not transition well into latter stages that may require more causal reasoning. The relationships between level of expertise, firm life cycle, use of different logics and performance are explored in Chapter 6.

4.2.1 The Bird-in-Hand Principle: Starting with Means and Creating New Effects

Earlier I mentioned the patchwork quilt as an apt metaphor for effectuation. Another example I like, particularly to illustrate the inverse relationship between means and ends in an effectual as opposed to a causal logic, is that of a chef cooking dinner. There are two ways the chef could organize the task. In the causal case, he selects a menu, comes up with good recipes for each item on the menu, shops for necessary ingredients, arranges proper implements and appliances, and then cooks the meal. The causal process starts with selecting a menu as the goal and finding effective ways to achieve the goal. In the effectual case, the chef begins by looking through the kitchen cupboards for ingredients and utensils. She then designs possible menus based on those ingredients and utensils. In fact, the menu often emerges as she is preparing the meal. The effectual chef starts with a given kitchen, and designs possible, sometimes unintended, even entirely original meals with its contents.

Note that in both cases the quality of the meal will still depend on how good the chef is. Neither process *entails* a better outcome. But in the causal scenario, what the outcome should be (irrespective of how good it will be) is selected in advance. The effectual scenario is more likely to lead to novelty.

In addition to making a patchwork quilt and cooking a meal, one can imagine a variety of simple examples: a carpenter who is asked to build a desk versus one who is simply given a toolbox and some wood; an artist who is asked to paint the portrait of a particular person versus one who is given a blank canvas and some paints; and so on. These are obviously oversimplified and highly individualistic examples (that is, they do not involve multiple stakeholders in any substantial way); nor do they involve a significant degree of Knightian uncertainty or environmental isotropy. To bring the definitions closer to reality through, say, the dinner example, we would have to add dynamics and contingencies of various kinds including multiple interacting chefs, hosts and dinner guests.

But the point is that in each example, the generalized end goal or aspiration remains the same in both causation and effectuation: to cook a meal,

to build a wooden artifact, to create a painting. In fact, an effect is the operationalization of an abstract human aspiration. What distinguishes causation and effectuation is in the problem frame: choosing among means to create a particular effect versus designing possible effects using a particular set of means. Whereas causal models consist of many-to-one mappings, effectual models involve one-to-many mappings.

Both causation and effectuation are integral parts of human reasoning that can occur simultaneously, overlapping and intertwining over different contexts of decisions and actions. Yet in the following thought experiment, I deliberately juxtapose the two logics as a dichotomy to enable clearer theoretical exposition.

Thought experiment: Curry in a Hurry

This example traces and contrasts both a causal and an effectual process for building an imaginary Indian restaurant called Curry in a Hurry. For the purposes of this illustration, I have chosen a typical causation process embodied in the procedures outlined in Kotler (1991). Recall that I used this same example in Chapter 2 while discussing the results of the data analysis in my study of entrepreneurial expertise. But it is worth repeating here to illustrate the theoretical differences in more detail.

The Kotler book in its many editions is considered a classic and is widely used as a textbook in MBA programs around the world. Kotler defines a market as follows: a market consists of all the potential customers sharing a particular need or want who might be willing and able to engage in an exchange to satisfy that need or want. The book suggests the following procedure for bringing a product or service to market (note that Kotler assumes the market exists):

1. Analyse long-run opportunities in the market.
2. Research and select target markets.
 - a. Identify segmentation variables and segment the market.
 - b. Develop profiles of resulting segments.
 - c. Evaluate the attractiveness of each segment.
 - d. Select the target segment(s).
 - e. Identify possible positioning concepts for each target segment.
 - f. Select, develop and communicate the chosen positioning concept.
3. Design marketing strategies.
4. Plan marketing programs.
5. Organize, implement and control marketing effort.

This process is commonly known in marketing as the STP or segmentation, targeting and positioning process.

Curry in a Hurry is a restaurant with a new twist, say, an Indian restaurant with a fast-food section. To implement this idea, the causal approach suggests that the entrepreneur start with a universe of all potential customers. Let us imagine that the entrepreneur wants to build the restaurant in the city of Pittsburgh, Pennsylvania, which will then become its initial universe or market.

Several relevant segmentation variables such as demographics, residential neighborhoods, ethnic origin, marital status, income level and patterns of eating out could be used. On the basis of these, the entrepreneur could send out questionnaires to selected neighborhoods and organize focus groups at say, the two major universities in Pittsburgh. Analysing responses to the questionnaires and focus groups, the entrepreneur could arrive at a target segment: for instance, wealthy families, both Indian and other, who eat out at least twice a week. Focusing on that segment would help her determine her menu choices, décor, hours, and other operational details. She could then design marketing and sales campaigns to induce her target segment to try her restaurant. She could also find some method of surveying other Indian and fast-food restaurants to develop plausible demand forecasts for Curry in a Hurry.

In any case, the process would involve considerable amounts of time and analytical effort. It would also require resources both for research and thereafter for implementing the marketing strategies. To sum up, the current causal paradigm suggests we move from a larger general universe inward to specifics – to an optimal target segment from a predetermined market. In terms of Curry in a Hurry, this could mean something like a progression from the entire city of Pittsburgh to Fox Chapel (an affluent residential neighborhood), to the Joneses (specific customer profile of a wealthy family), as it were. See Figure 2.1 again for an illustration of this.

If our imaginary entrepreneur were instead to use processes of effectuation to build her restaurant, she would proceed in the opposite direction. Note that effectuation is suggested here as a viable and descriptively valid alternative to the segmentation–targeting–positioning process, not as a normatively superior one.

For example, instead of starting with the assumption of an existing market and investing money and other resources to design the best possible restaurant for that market, she would begin by examining the particular set of means or causes available to her. Assuming she has limited monetary resources – let's say \$30 000 – she should think creatively to bring the idea to market with as close to zero resources as possible. She could do this by convincing an established restaurateur to become a strategic partner or by doing just enough market research to convince a financier to invest the money she needs to start the restaurant. Another effectual strategy

would be to convince a local Indian or a local fast-food restaurant to let her sell a selection of Indian fast food at their establishments. The particular items selected and other such details would be seat-of-the-pants and tentative – perhaps a process of satisficing (Simon, 1959).

Several other courses of effectuation can be imagined. Perhaps she actually would contact one or two of her friends or relatives who work downtown and bring some of her food for them and their office colleagues to taste. If the people in the office like her food, she could get a lunch delivery service going. Over time, she might develop enough of a customer base to start a restaurant. Or else, after a few weeks of trying to build the lunch business, she might discover that the people who said they enjoyed her food were in fact responding less to the food and more to her quirky personality and unusual life perceptions. Our imaginary entrepreneur might now decide to give up the lunch business and make a cooking video, or start writing a book, going on the lecture circuit and eventually building a business in the motivational consulting industry!

Given the exact same starting point – an idea about starting an Indian restaurant – but with a different set of contingencies, she might end up building one of a variety of businesses. To take a quick tour of some possibilities, consider the following: whoever first buys the food from our Curry in a Hurry entrepreneur becomes by definition the first target customer. By continually listening to the customer and building an ever-increasing network of self-selected stakeholders and strategic partners, she can then identify a workable segment profile. For example, if the first people who buy the food and come back for more are working women of varied ethnic origin, then this becomes her target segment. Depending on what this first customer really wants, the entrepreneur can start defining her market. If the customer is interested primarily in the quality and convenience of the food, rather than its ethnicity, she could start targeting all working women in the geographic location, or think in terms of locating more outlets in areas with working women of similar profiles. This could become a franchise operation, maybe called Women in a Hurry.

Or if the customer is interested primarily in the idea of ethnicity or entertainment value of the cuisine rather than its convenience, she could develop other products such as catering services, party planning and so on – Curry Favors? (I apologize for the cheesy names, but I hope they get the message across.) Or else, if the customers buy food from her because they actually enjoy learning about new cultures, she could offer lectures and classes, maybe beginning with Indian cooking and moving on to cultural aspects including concerts and ancient history and philosophy, and the profound idea that food is a vehicle of cultural exploration – International School of

Curry? Or maybe what really interests them is theme tours and other travel options to India and the Far East – Curryland Travels?

In a nutshell, using effectual processes, she can build several different types of firms in completely disparate industries. This means that the original idea (or set of causes) does not imply a single strategic universe or market for the firm (or a single effect). Instead, the process of effectuation allows the entrepreneur to create one or more effects, irrespective of the generalized end goal she started out with. Recall that the 27 expert entrepreneurs in my study began with the exact same imaginary product, *Venturing*, but ended up building firms in 18 different industries. Effectuation not only enables the realization of several possible effects (although generally one or only a few are actually realized in the implementation), but also allows the decision makers to change their goals and even shape and construct them over time, making use of contingencies as they arise.

Furthermore, even the generalized aspiration of starting a business is not a necessary starting point for effectuation. Several successful businesses and even great companies have begun without precise initial visions on the part of the founders. I present two such examples – Tom Fatjo's founding of the waste management giant Browning Ferris and Thomas Stemberg's founding of Staples, the large chain of office supplies stores – in the following sections.

In a similar vein, the Curry in a Hurry entrepreneur's journey of effectuation could also have been the result of any one of a variety of serendipitous events. For example, a suggestion made by a friend after tasting her food on a social occasion could have started the process, or, as happens in the case of many entrepreneurs, an unexpected misfortune might have forced her to start earning her own living. Or, given the increased interest in entrepreneurship in business schools, maybe the idea was born in a class project.

Means: who I am, what I know and whom I know

In the think-aloud protocol experiment, expert entrepreneurs started with three categories of means: their identity, their knowledge base, and their social networks. Extant research has already shown the importance of prior knowledge (Shane, 2000; Wiklund and Shepherd, 2003) and social networks (Hite and Hesterly, 2001; Uzzi, 1997) for entrepreneurs creating new firms and markets. But the role of identity is virtually unexamined and so merits some attention here.¹

Entrepreneurs often explain their actions and decisions in terms of something fundamental about who they are rather than their more superficial preferences. Sometimes their identities have to do with being an entrepreneur, however idiosyncratically interpreted; at other times, it comes

from other areas of their lives: religious faith, political affiliations, childhood traumas, aesthetic pursuits, or even loyalties to sports teams. Take, for example, a quote from subject E5 in my study:

I was not afraid to take risks. I knew my identity was not in my work. It's just . . . real important, cause you're going . . . going to take some risks. Especially if you're going to take philosophical risks about . . . that are different, you know . . . to take the . . . the position that shareholders are not the owners of the company, and that . . . that you are . . . that all . . . there's a lot more owners and . . . and they're all to be treated with respect and equality. There's no hierarchy among . . . the stakeholders, it's very radical, so you better . . . and you . . . and you . . . you're fired for thinking that way, especially if you act on those thoughts. And I've almost been fired several times. But . . . it . . . it's okay, because . . . I'm not . . . my identity is not in . . . being CEO of this company. Uhm . . . it would be hard . . . it would be painful to leave it, not so much because my identity is not here because . . . but because I love this. I love this. I love this place and the people, and I'm doing what I'm doing, you know.

It is possible to argue that identity-based decision criteria, like any other, are nothing but a certain type of preference ordering. Maybe. But reasoning from identity often severs the causal link between action and outcome, between choice and consequence (March, 1994). March uses the example of Don Quixote to show how knowing what a knight would do in any circumstance makes Quixote very decisive even in the face of extreme uncertainty about possible consequences. As March puts it:

Quixote reminds us
That if we trust only when
Trust is warranted, love only
When love is returned, learn
Only when learning is valuable,
We abandon an essential feature of our humanness.

Quixote's decision criteria are deeply rooted in his sense of identity: *Jo se quien soi*. In general, using identity-based decision criteria frees entrepreneurs from having to order their preferences for specific consequences of their choice and allows them to take decisive action even in the face of Knightian uncertainty. That is because the notion of identity stands in the same relationship to preferences as procedural rationality does to substantive rationality (Simon, 1978). For example, when faced with identical circumstances, a macho identity may lead one to seek revenge, whereas a Christian identity may lead a person to forgive. In other words, identity consists of preferences for particular processes or ways of living and deciding rather than for particular consequences. Identity may be fictive or real; freely chosen or socioculturally constructed; good or evil.

When outcomes are predictable, it makes sense to base decisions on preference orderings for particular outcomes. But when outcomes are unpredictable, or our preferences are ambiguous, it serves us well to have a strong sense of identity (who we are rather than what we want) and process (how to make decisions rather than what decisions to make). The use of such criteria, however, often leads to the transformation of preferences and even the generation of new ones, allowing decision making to occur without taking preferences as either predetermined or well ordered. As Paul Slovic stated in his address to the American Psychological Association:

One of the main themes that has emerged from behavioral decision research during the past 2 decades is the view that people's preferences are often constructed in the process of elicitation. This concept is derived in part from studies demonstrating that normatively equivalent methods of elicitation often give rise to systematically different responses. These preference 'reversals' violate the principle of procedure invariance that is fundamental to theories of rational choice and raise difficult questions about the nature of human values. (Slovic, 1995: 364)

This is reminiscent of March's arguments that rational choice based on preferences assumes that tastes are absolute, relevant, stable, consistent, precise and exogenous, some or all of which may be empirically invalid in most human decisions. Similarly, for expert entrepreneurs, goals such as making profits, increasing sales, or maximizing shareholder value may each be at best one of several constraints on the decision to be made, not the objective function in organizational choices. Such entrepreneurs work hard to construct a strong identity and embed it in a variety of routines, decision processes, recruitment procedures and strategic choices that permeate the organizations they found.

In such cases, the persistent problems of reasoning based on preferences identified in the vast literature on the subject are overcome by reasoning from identity: identity allows us to construct our preferences when preferences do not exist; it allows us to experiment – to 'try things on for size' – when preferences are not known. Identity also allows us to manage our preferences so that changes in preferences are not arbitrary; it also allows us to play conflicting preferences strategically against each other – and guides our strategies in this play. And when our preferences are 'bad' for us, identity tells us which precommitments to use to increase our self-command (Schelling, 1984).

It is important to note that identity (who I am) depends on and is changed by knowledge (what I know) and networks (whom I know) and vice versa. The three categories of means are not mutually exclusive and

independent. Furthermore, together they also determine resources (what I have). In the final analysis, the effectual entrepreneur takes these three categories of means as primitives; what I have and where I am (the circumstances I find myself in) are both derivatives of those primitives. But any and all available means are patches for the effectual quilt. Ultimately, it is not the particular patches that are important; it is what the entrepreneur *does* with them.

In Chapter 5, I shall examine in detail how the effectuator begins with his or her given set of means and stitches together a venture that may, under certain conditions, result in new markets. For now it is adequate to note that the initial patches consist of the effectuator's identity, prior knowledge and social network.

4.2.2 The Affordable-Loss Principle

Causal models focus on maximizing returns by selecting optimal strategies. Effectuation begins with a determination of how much one is willing to lose and leveraging limited means in creative ways to generate new ends as well as new means. In the Curry in a Hurry example, the chef who uses a causal logic calculates up front how much money she needs to start the restaurant and invests time, effort and energy in raising that money. The effectuator, in contrast, tries to estimate the downside and examines what she is willing to lose in order to start the venture. She then uses the very process of building the venture to bring other stakeholders on board and creatively leverages slack resources available in the world. At each stage of the process she chooses options that create more options in the future.

The estimate of affordable loss does not depend on the venture but varies from entrepreneur to entrepreneur and even across his or her life stages and circumstances. By allowing estimates of affordable loss to drive her decisions about which venture she starts, the effectuator reduces her dependence on predictions. To calculate expected returns, we have to estimate future sales and possible risks that constitute our cost of capital, and then raise enough money to make the venture happen. To calculate affordable loss, all we need to know is our current financial condition and a psychological estimate of our commitment in terms of the worst-case scenario. This is not only a non-predictive mode of estimation, it also is a way to nullify the role of uncertainty in early-stage funding decisions.

The 'plunge' decision provides a good illustration of the affordable-loss principle. Imagine an entrepreneur who is considering quitting his well-paying job to start his own firm. Causal logic suggests he should do some market research and competitive analysis to estimate the potential risk and

return to the venture and then decide whether he wants to take the plunge. His musings might go as follows:

I need \$2 million to start this venture, and I hope to break even in two years. I can put in \$250,000, so I need to raise \$1.75 million before I can take the plunge – even without taking into account my opportunity costs in terms of two years' salary.

For the causal entrepreneur, taking the plunge is a matter of specifying parameters as accurately as possible in order to make a good decision. EVectual logic, in contrast, suggests the entrepreneur set an upper bound on what she is willing to lose in order to start the venture. So the eVectuator might think to herself, 'I have always wanted to be my own boss. I think I can aVord to take two years and invest my \$250000 to try this out. In the worst-case scenario, I will lose the money and would be back in the job market in two years. But if I don't do it now (I am almost 40 and my kids are oV to college soon), when will I ever do it?' For the eVectual entrepreneur, taking the plunge involves designing a venture using what she has, and what others may eventually bring to the table. This may or may not include additional funding of \$1.75 million.

Notice that in the causal case, all the information is about things that are for the moment outside the decision maker's control and are almost entirely dependent on the effect to be created. In the effectual case, the information is about the entrepreneur's own life, current commitments and aspirations, involving trade-offs between subjective risks and values over which she can assert some control. This can work, of course, only if she is willing to adjust the shape and thrust of her venture (i.e. the effect) to the extent and intensity of her commitment rather than to some 'opportunity' determined exogenously by a 'market'. In other words, her effects have to adapt to her means, and not vice versa.

The affordable-loss principle also dictates that the effectuator find creative ways to bring her idea to market within the means she can assemble. This usually necessitates taking on outside stakeholders, who themselves may or may not use the affordable-loss principle in committing resources to the budding venture. How a chain of stakeholders, each investing only what he or she can afford to lose, can construct new firms and markets will be closely examined in the next chapter, where I develop a dynamic model of the effectual process.

The affordable-loss principle is evident in the cognitive processes that expert entrepreneurs used to solve the problems I assigned to them. In general, they either preferred the cheapest alternative or came up with creative ways of doing things at no cost to themselves. Furthermore, they explicitly saw themselves as financially risk averse and cost conscious. To quote just one example:

I'll start with cheap make sure I . . . cover my cost don't have to take huge risks . . . uhm . . . one thing I'm sure about my experience . . . never take any risk if you can help it . . . it is just the opposite of what most people think about . . . entrepreneurs. [E5]

Entrepreneurs generally accept some amount of risk as inevitable in any and all situations. This allows them to enter the game without overthinking the odds and makes them appear risk loving. Yet they are unwilling to wager on expectations of high returns or on their own ability to predict and side-step downside potential. This means they play the game very conservatively, and hence appear risk averse. There is independent evidence for this. See Miner and Raju (2004) for a meta-analysis of 14 studies on the subject. Also, in an earlier study comparing how entrepreneurs and bankers perceive and manage risk, I found that entrepreneurs sought out options with lower predicted variance and lower predicted returns than bankers who picked projects with high predicted returns in the belief that they could control the downside through a variety of analytical and predictive strategies (Saravathy et al., 1998). Thereafter entrepreneurs came up with more ways of increasing returns at any given level of risk than bankers who merely accepted predictions of potential return. Perhaps the most spectacular evidence for the curious combination of acceptance of the downside in tandem with the refusal to wager on expected return comes from Tom Fatjo's autobiography.

Fatjo was an accountant in Houston when a meeting in his subdivision challenged him to take up the garbage collection problem the community was facing. In 1970, he borrowed \$7000 for his first truck. Every day, Fatjo woke up at 4 am to collect garbage for two hours before changing into a suit to go to work in his accounting office. This went on for over a year before he let go of the security blanket of a white-collar profession to found the waste management giant Browning Ferris. Of course, when he made the decision to take the entrepreneurial plunge, he did not know he would end up building a billion-dollar enterprise. Here is how he describes his moment of decision:

Within a week I was almost frantic. My food wouldn't seem to digest, and I had a big knot in my chest. When I was doing one thing, I thought of two others which had to be done that same day.

The pressure just kept building. Even though it was cold, my body was damp from continuous perspiration. Since so much of what I was doing in the accounting firm had to be done by the end of the tax year and involved important decisions with key clients, I needed to spend time thinking through problems and consulting with them as they made decisions. I was caught in a triangle of pressing demands, and I felt my throat constricting as if there were wires around my neck.

That night I was exhausted, but I couldn't sleep. As I stared at the ceiling, I fantasized all our trucks breaking down at the same time. I was trying to push each of them myself in order to get them going. My heart began beating faster in the darkness and my body was chilled. The horrible thought that we might fail almost paralyzed me.

I wanted to quit and run away. I was scared to death, very lonely, sick of the whole deal. As hard as I tried to think about my life and what was important to me, my mind was just a confused mass of muddled images . . . I remembered committing myself to make it in the garbage business 'whatever it takes!' I lay back on my pillow and felt a deep sigh within myself – 'Good Lord, so this is what it takes', I thought, then rolled over and got some restless sleep. (Fatjo, 1981: 32)

We can of course explain this 'choice' in terms of risk preference, or the escalation of commitment bias, or merely the blind groping of a chaotic emotional reaction to stress. Given the fact that Fatjo did indeed leave the accounting firm and start the garbage firm, it seems to me like none of the above. Furthermore, he was not basing his decision on a calculation of expected return, nor did he have the goal clarity of a visionary. Fatjo was simply coming to terms with the worst-case scenario and committing to the project nonetheless. His decision embodies the principle of affordable loss.

At first glance it is easy to confuse the affordable-loss principle with min–max analysis or real-options logic. Both real options and min–max are useful decision tools under uncertainty. Furthermore, as I shall show in the ensuing paragraphs, the affordable-loss principle is useful in both types of analyses. But the use of the affordable-loss principle in effectuation differs from its use in real options and min–max in two ways: in the content of the information required to make the decision, and in terms of the assumptions underlying the structure of the decision problem. In sum:

- Calculating affordable loss within an effectual logic does not require computing outcome and preference probabilities.
- Also, unlike a decision tree structure implicit in min–max or real options analyses, affordable-loss logic can accommodate a generalized semi-lattice structure that includes overlapping decision alternatives.²

Let us examine the plunge decision using each of these three types of analyses in turn.

Classic decision tree

Figure 4.1a represents the plunge decision as a classic decision tree.³ The entrepreneur is faced with the choice of staying in his current job with outcome *S* representing the net present value (NPV) of his steady stream of income from the job, or starting a new venture with *I* representing the

level of investment required. There is a probability of success p to achieve the best consequence of a return R on investment I and a probability of $q = 1 - p$ for the worst outcome of venture failure. There are three assumptions embedded in this decision tree that are also carried over to the real-options and min-max analyses:

1. The possible outcomes S , gain of R , loss of I , etc. are enumerable and predictable.
2. The outcomes are independent of each other – i.e. they are non-overlapping.
3. The list, probabilities and magnitudes of outcomes are not endogenous to the decision-maker's initiatives.

In the effectual case, none of these assumptions is necessary. Instead the outcomes to effectuation need not be enumerable, may be overlapping and are for the most part endogenous to the effectual process. But even in the classic decision tree analysis where these assumptions hold, the affordable-loss principle is useful. The decision tree recommends taking the plunge only if the expected value of return to the new venture $pR - qI$ is greater than S . Affordable loss can add to the analysis by suggesting a maximum limit on I , thereby limiting the loss in the worst-case scenario.

Real-options logic

Recent research in management has focused on real-options logic as an alternative to the classic decision tree above (McGrath, 1997). Real-options logic involves breaking up an investment into stages so that the entrepreneur also has the option to abandon the project at the end of each stage. This is represented in Figure 4.1b as a series of investments I_i . In other words, in the real-options case, the decision depends mostly on R and S , with I being reduced in relevance. Affordable loss continues to be useful in this case in determining limits on what I should be.

Real-options logic has come under considerable criticism precisely because it ignores the possibilities offered by a more 'effectual' (in my words, not in those of the critics quoted below) approach:

A prominent characteristic of strategically interesting settings is that, having made an initial investment, firms can actively engage in follow-on activities that can influence outcomes and identify new possible actions and goals. While in established real options theory there is recognition that the option to make or forego follow-on investments is a source of value and that prior stage-setting investments may be a precondition for the exercise of these options, there is an assumption that the nature and quality of options are independent of the firms' interim activities. The implicit imagery is of a firm 'buying a ticket' to engage in

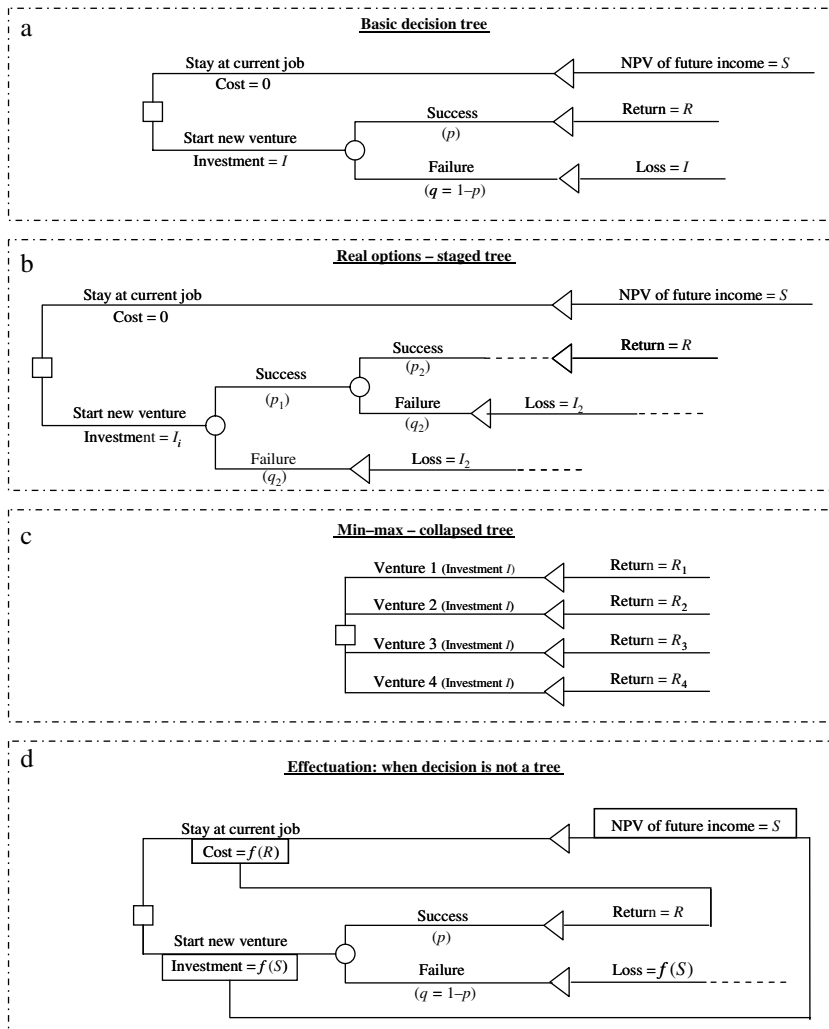


Figure 4.1 The plunge decision

some pre-specified opportunity set, thus ignoring the potential for the firm to mold and enhance initiatives, learn about new opportunities, and discover new possible initiatives not conceived of at the time of the initial investment. (Adner and Levinthal, 2004: 120)

In contrast, an effectual use of the affordable-loss principle is drenched with the possibility that entrepreneurs can mold, shape, transform and

reconstitute current realities, including their own limited resources, into new opportunities.

Min–max logic

In the two types of analyses so far, we have assumed that the choice is between staying in a job and starting a new venture. But once the entrepreneur has decided to take the plunge decision, he may still have to select among multiple ventures. Here a min–max logic is relevant. Even in this case, however, affordable loss is a useful principle. Shackle (1966) provides an example:

It is practical and reasonable to regard the focus-loss, in absolute terms, as depending on the nature and scale of the enterprise concerned. Thus, by choice of an appropriate kind, or an appropriate size, of plant or enterprise, he can adjust the greatest amount he stands to lose, that is, his focus loss, to the amount which, given the size and character of his assets, he can ‘afford’ to lose. When by this test he has listed a number of enterprises of various kinds, he can finally choose that one which offers the largest focus gain. (Shackle, 1966: 765)

As shown in Figure 4.1c, the min–max decision depends only on R since S has been removed from consideration and I has been selected through the affordable loss principle. But it still requires reliable predictions about future returns, whereas in the effectual case such predictions are unnecessary. Note that my argument does not eliminate or reduce the relevance of the motivating power of upside potential, only the necessity of calculating accurate predictions of it. Instead the entrepreneur’s overall belief that success is likely to bring substantial, even if unspecified, gains (financial and otherwise) provides a sufficient condition for taking effectual action.

Effectuation – when decision is not a tree⁴

In all three cases above, we have not considered the opportunity costs of *not* starting a new venture. The opportunity cost of starting a venture is very clear – it is equal to S or some function $f(S)$. But the opportunity cost of not starting a venture – that is, the cost of staying in the current job – has been taken to be zero in all three causal analyses of the plunge decision. Effectuation, in contrast, explicitly takes into account the fact that there exist opportunity costs $f(R)$ (as Figure 4.1d illustrates) of not starting the venture. Since effectual outcomes are uncertain in a Knightian sense, these opportunity costs may be arbitrarily high. Also, in the effectual case, investment in the new venture does not depend on the venture. It is instead a function of the entrepreneur’s current income and wealth, represented as a function of S in Figure 4.1d. In other words, effectuation argues that the plunge decision cannot be drawn as a tree; it is better modeled as an overlapping semi-lattice.

Affordable loss can be used to reduce risk in all four settings by focusing on controlling downside scenarios and finding ways to reach the market with a minimum expenditure of such resources as time, effort and money. In an effectual setting, it makes uncertainty relatively irrelevant to the entrepreneur who creatively finds ways to get to market through existing slack in the world and investments from a variety of stakeholders. Expert entrepreneurs have mastered the affordable-loss principle and are able to translate it into the zero-resources-to-market principle. Furthermore, instead of combining the affordable-loss principle with computations of expected return to determine which particular new venture to start as do analyses using causal trees, effectuation combines affordable loss with self-selected stakeholders and their ability to mold and construct new opportunities as primary criteria for choosing among new ventures. I explicate this in detail through a dynamic model in the next chapter.

Using affordable loss forces effectuators to seek stakeholders within their immediate vicinity, whether within their geographic or sociocultural vicinity, within their social network, or within their area of professional expertise. Furthermore, by choosing not to tie themselves to any theorized or preconceived 'market' or strategic universe for their idea, effectuators open themselves to surprises about which markets they will eventually end up building their business in or even which new markets they will create.

4.2.3 The Crazy-Quilt Principle

Causal models such as the Porter model in strategic management emphasize detailed competitive analyses (Porter, 1980). Effectuation emphasizes alliances and precommitments from stakeholders as a way to reduce and/or eliminate uncertainty and erect entry barriers. In fact effectuators do not choose stakeholders on the basis of preselected ventures or venture goals; instead, they allow stakeholders who make actual commitments to participate actively in shaping the enterprise. The crazy-quilt principle emphasizes that inputs from stakeholders who actually make commitments to the venture should be taken into account without regard to opportunity costs as to *possible* stakeholders who may or may not come on board later. The crazy-quilt principle, therefore, combined with the notion of 'The bird in hand is worth two in the bush' is crucial to effectual logic and has vital ramifications for the concurrent creation of markets and firms. The next chapter will show how the static principles of effectuation can be brought together in a dynamic and interactive model of the effectual process.

Commitments from key stakeholders destroy uncertainty by contracting along certain dimensions for the future, and as the stakeholders act on those contracts and the network grows, the future that comes to be begins

to look like the contracts agreed upon. Effectual entrepreneurs focus their efforts on the image of the future coalescing out of a dynamic series of stakeholder interactions rather than crafting a vision up front and then attempting to force it or 'sell' it to targeted stakeholders.

One corollary of the crazy-quilt principle is that effectuators tend to de-emphasize systematic competitive analysis. Because they start the process without assuming the existence of a predetermined market for their venture, detailed competitive analyses do not seem to make much sense to them at the startup phase. As several of the subjects in my study explained,

At one time in our company, I ordered people not to think about competitors. Just do your job. Think only of your work. [E3]

since this is a new product I don't think I have a lot of questions about competitors . . . I think we need not analyse who . . . potential competitors could be . . . at this point until one of them surfaced and . . . and really indicated that they might be a competitor in this. I don't think I would have any specific questions . . . [E2]

Instead expert entrepreneurs build partnerships right from the start. In fact, the preferred beginning for a startup among the subjects seemed to be the induction of customers into stakeholder partnerships. Again, to hear it from the horse's mouth:

Traditional market research says, you do very broad based information gathering, possibly using mailings. I wouldn't do that. I would literally, target, as I said initially, key companies who I would call flagship, do a frontal lobotomy on them . . . The challenge then is really to pick your partners, and package yourself early on before you have to put a lot of capital out. [E1]

In fact, the crazy-quilt principle dovetails very well with the affordable-loss principle to bring the entrepreneur's idea to market at really low levels of capital outlay. Because the amount of investments any given entrepreneur can afford to lose is likely to be rather small, it makes sense for the effectual entrepreneur to work with any and all self-selected stakeholders rather than to expend resources in chasing stakeholder targets based upon predictions of where the market for their venture will be. Not being wedded to particular markets allows the growing patchwork quilt of stakeholder partnerships to converge to new markets or determine which particular markets the new venture will end up transforming.

4.2.4 The Lemonade Principle

Causal models almost always seek either to avoid the unexpected or to achieve predetermined goals *in spite of* contingencies. Effectuation, in

contrast, is about exploiting those contingencies. The effectuator leverages uncertainty by treating unexpected events as an opportunity to exercise control of the emerging situation. This principle echoes the widespread bromide, ‘When life gives you lemons, make lemonade’.

The relationship between planning, contingencies and uncertainty is radically rearranged in an effectual logic. Because effectuators often begin with only a very loose notion of their goals, they can make up their plans in an incremental fashion, utilizing uncertainty and contingent information as resources for their goals (Lindblom, 1959) rather than relying on goals as determining factors of resource acquisition and choice. Decision makers therefore accumulate and take advantage of path dependencies in the effects they choose. Uncertainty is a resource and a process rather than a disadvantageous state.

The lemonade principle is at the heart of entrepreneurial expertise – the ability to turn the unexpected into the valuable and the profitable. As a couple of expert entrepreneurs put it:

I always live by the motto of Ready–fire–aim. I think if you spend too much time doing ready–aim–aim–aim–aim, you’re never gonna see all the good things that would happen if you actually start doing it and then aim. And find out where your target is. [E3]

Never underestimate serendipity. And again I think that . . . in these type of situations, the traditionalists, which I call the M.B.A. from Harvard versus the entrepreneur . . . the M.B.A. from . . . Harvard would confine themselves to certain paradigms that existed before. The entrepreneur would break the paradigm. They’ll walk into a bank that they’ve never been in before and say hey how about give me a loan. [E7]

Enduring entrepreneurial firms are often products of contingencies. Their structure, culture, core competence and endurance are all residuals of particular human beings striving to forge and fulfill particular aspirations through interactions with the space, time and technologies they live in. For example, we could speculate whether Wedgwood pottery would have been possible if the potter Josiah Wedgwood had not been introduced by his doctor to the gentleman philosopher Thomas Bentley and wooed him into a partnership that resulted in a brand and a great company that has lasted over two centuries. The key to the Wedgwood fortune was the realization that people put their money where their aspirations are and that pots and vases could become vehicles of social mobility. Similarly, in our time, historians speculate what Microsoft would have been if IBM had written a different type of a contract or if Gary Kildahl had not been out flying his airplane the day IBM came calling. Yet it is not the contingencies themselves that shaped the companies in the preceding examples. How the

entrepreneurs *leveraged* those contingencies is what forms the core of an effectual logic.

An important example of the lemonade principle can be found in the history of Staples, the discount office supplies superstore. On the Thursday before the fourth of July weekend in 1985, Thomas Stemberg, who had recently lost his job as division manager for a supermarket chain, was working on a business plan for starting a new chain, when he ran out of the printer ribbon for his Apple Imagewriter. When he went out to purchase new ribbon, he simply could not get it. Either stationery stores had closed early for the weekend, or the ones that were open did not carry the ribbon. 'It dawned on me,' he said in an interview with CNN's Stuart Varney, 'that not only could small entrepreneurs not get stationery at the rate of bigger companies, sometimes they couldn't get it at all'. He still had no ribbon to finish his business plan over the weekend, but he had found the new venture he actually wanted to start in that negative contingency.

The realization that not all surprises are bad and that surprises, whether good or bad, can be used as inputs into the new venture creation process evokes economists' discussions on the subject (Shackle, 1953). Surprises are usually relegated to error terms in formal models. Instead an effectual logic suggests they may be the source of opportunities for value creation, but only if someone seizes upon them in an instrumental fashion and imaginatively combines them with extant inputs to create new possibilities.

4.2.5 The Pilot-in-the-Plane Principle: Non-Predictive Control

Each of the principles above implies a logic of non-predictive control. Causal and effectual logics both seek control over the future. But causation focuses on the predictable aspects of an uncertain future. The logical premise for it goes like this: *To the extent that we can predict the future, we can control it*. Effectuation, on the other hand, focuses on the controllable aspects of an unpredictable future. The logic here is: *To the extent that we can control the future, we do not need to predict it*.

This logic is particularly useful in areas where human action (locally or in the aggregate) is the predominant factor shaping the future. In other words, a logic of non-predictive control seeks to put the pilot back in the plane.

Carnegie Mellon University offers a variety of courses in information systems, including some that have to do with automating human decision processes. After discussing several papers that showed how algorithms and expert systems outperformed human decision-makers in several domains including medical diagnosis, automotive diagnostics, admissions both at the school and in human resources departments of large organizations, and

of course, in piloting airplanes, the professor mentioned that people were still reluctant to trust these ‘intelligent’ machines. When we enquired why, he replied, ‘I like the fact that the plane has an auto pilot. But I like even more the fact that there is a pilot – *just in case* – don’t you?’

And that is exactly the point of the pilot-in-the-plane principle. Especially in a problem space characterized by Knightian uncertainty, goal ambiguity and environmental isotropy, the pilot in the plane – *just in case* – is often the window to unexpected opportunities, and the key to outliving disasters. The pilot-in-the-plane principle clarifies why we need entrepreneurs in the first place. It harks back to Knight’s original thesis about why economics needed a fourth factor of production, in addition to land, labor and capital with their attendant costs of rent, wages and interest, respectively. Neoclassical economics had no room for the entrepreneur. And at equilibrium, profits equalled zero. But Knight argued that we need entrepreneurship because someone has to take on that third type of uncertainty in which the very instances cannot be classified. Yet Knight did not specify how the entrepreneur took that uncertainty on. He basically threw in the towel:

The ultimate logic, or psychology, of these deliberations is obscure, a part of the scientifically unfathomable mystery of life and mind. We must simply fall back upon a ‘capacity’ in the intelligent animal to form more or less correct judgments about things, an intuitive sense of values. We are so built that what seems to us reasonable is likely to be confirmed by experience, or we could not live in the world at all. (Knight, 1921 [2002]: 227)

That logic, at least a significant part of it, is effectual. Expert entrepreneurs deal with Knightian uncertainty by refusing to trust predictions. Instead they work to ‘confirm by experience’ what seems reasonable – that is doable and to them worth doing. In other words, they first devise actionable hypotheses and then actually reify or falsify them through action upon the world and through interactions with others. The only way to deal with Knight’s third urn, the effectuator argues, is to make it from scratch with the bits and pieces already at hand.

Effectuation brings into stark relief the predominant ontological stance of most of the literature on decision making under uncertainty. Efforts in this stream of research have been dedicated almost exclusively to causal analyses that lead to improved predictions precisely because good prediction allows us to capitalize on our expectations about the future. But focusing so much on causal and, hence, predictive aspects, we have mostly neglected the study of techniques of control that do not require us to predict the future. Kahneman and Lovallo (1993b), for example, simply assume that subjects should always approach the future as predictable, and confidently prescribe ‘corrective’ actions that need to be taken to ‘overcome

the biases' and achieve 'optimal behavior in every situation.' I agree with Kahneman and Lovallo that there can be circumstances in which a disregard for predictive information may lead to over-optimistic forecasts and to exaggerated risk aversion. But in cases where there are good reasons to approach the future as truly unknowable, merely focusing on better prediction may not be useful, or even meaningful. This is particularly true in domains of design, whether the design involves physical or social artifacts – a topic I shall examine in great detail in Chapter 7. In his seminal book, *The Sciences of the Artificial*, Simon (1996) highlights this point:

Since the consequences of design lie in the future, it would seem that forecasting is an unavoidable part of every design process. If that is true, it is cause for pessimism about design, for the record in forecasting even such 'simple' variables as population is dismal. If there is any way to design without forecasts, we should seize on it. Simon (1996: 147)

One of the most telling examples of a domain where the future may be truly unknowable is the introduction of a new product in a new market: the 'suicide' quadrant in Figure 4.2.

	Existing market	New market
Existing product		
New product		Suicide quadrant

Figure 4.2 Typology on new-venture business models

When the expert entrepreneurs were specifically asked about this during the informal interview after the experiment, several of them mentioned a preference for the suicide quadrant. Their argument was that if the market was more predictable, someone smarter and with deeper pockets could easily colonize that space. It is only when the market is truly unpredictable that the small, lean and mean startup entrepreneur has a real chance of shaping it into something innovative and valuable. In other words, it is in the suicide quadrant that we really need a pilot in the plane. I suspect Burt Rutan and the team at SpaceShipOne would agree. Although neither the expert entrepreneurs nor Rutan and his team *see* this as the 'suicide' quadrant, nor do they even see themselves as risk takers. The name of the game instead is control – non-predictive control.

In commercializing new technologies, pioneering entrepreneurs often find that formal market research and expert forecasts, however sophisticated in their methods and impeccable in their analyses, fail to predict where the markets will turn out to be, or what new markets will come into existence. Christensen (1997), Mintzberg (1994) and others have documented a wide variety of cases that illustrate this unpredictability in business. Human history also attests to this unpredictability in other areas – such as Columbus's discovery of the New World, the fall of the Berlin Wall and the organization of Mothers Against Drunk Driving. In each of these cases, causal maps were either non-existent, or less useful than effectual action and interaction.

I shall end this chapter with a note of caution. All the examples I have used to describe the principles constituting an effectual logic are 'good' in the sense that they have led to productive enterprises in the world. But the fact is that there is nothing inherent in effectuation that prevents it from leading to effects that are detrimental or value-destroying in one sense or another. All that an effectual approach guarantees is that self-selected stakeholders in the early stages will have a genuine voice in shaping the new ventures and markets that come to be, that these ventures and markets are not inevitable nor are they predetermined by invariant laws or by economic, behavioral and social forces.

In using an effectual logic to create products and markets, entrepreneurs and their partners may end up creating harmful and problematic effects for the society they live in. The effects they create may reflect the ignorance and cupidity as well as the values and aspirations of the people who participate in the creation of new urns and games of the future. The rise and fall of Enron, for example, contains instances of effectual as well as causal logics.

On the one hand, this may be a larger problem that cannot be solved through either causal or effectual approaches. For that we might need to examine the philosophical basis underlying an effectual logic. I shall take

up that endeavor in Chapter 9. On the other hand, a fuller understanding of effectual logic may allow us to tackle social problems that have eluded some of our best efforts. I speculate on that at some length in Chapter 10.

For now, I return to developing a dynamic model of effectuation and tracing its role in the creation of new markets.

NOTES

1. Kisfalvi (2002) is an exception.
2. Both tree and semi-lattice are structures of mathematical sets and used to model how collections of small sets make up a larger complex system. A collection of sets forms a semi-lattice if and only if, when two overlapping sets belong to the collection, the set of elements common to both also belongs to the collection. A collection of sets forms a tree if and only if, for any two sets that belong to the collection, either one is wholly contained in the other, or else they are wholly disjoint. A tree, therefore, is a semi-lattice that does not contain overlapping sets.
3. In Figures 4.1a–d, I have used the graphical notation of Behn and Vaupel (1982) to illustrate the four types of analyses of the plunge decision.
4. With apologies to Christopher Alexander. See 'A city is not a tree', <http://www.rudi.net/bookshelf/classics/city/alexander/alexander1.shtml>.

5. Understanding effectuation: dynamics of the effectual process

The dynamic process of effectuation I illustrate in this chapter has been induced from Nicholas Dew's empirical investigations into the birth of the Radio Frequency Identity (RFID) industry. In his research, Dew interviewed everyone involved in bringing together the four streams of innovations (going back to 1945) that constituted the technological architecture of RFID tags and the institutional structures of the seemingly unending new markets for them. He also collected a variety of published materials and participated in the conference that officially launched the industry in September 2003. A large part of what I am about to present is directly attributable to our collaborations (Sarasvathy and Dew, 2005b).¹

5.1 WHAT IS A MARKET?

Before we define the problem of how new markets come to be, we need to define the term 'market'. Like fundamental terms in any major line of inquiry – for example, 'mass' in physics, or 'life' in biology – markets are easier to argue about than to define. Ronald Coase once commented that markets – one of the two central institutions of capitalist societies (the other is firms) – had a 'shadowy' existence in the economic literature (Coase, 1988). Part of this shadowy existence is due to the fact that the word 'market' is used in a large variety of ways (Menard, 1995). The various descriptions could be divided into three distinct categories: demand, supply and institutions.

When we talk about the market for an established product like Coke, we include all three meanings of 'market' listed above. First, there are people who want to drink Coke and are willing and able to pay for it; secondly, there are people who are willing and able to make Coke for the price customers will pay; and thirdly, there are a variety of institutions such as distribution mechanisms and the Federal Drug Administration that enable Coke to get safely from the producer's hands into the consumer's body. The market for Coke is as easy to recognize as it is to recognize that emeralds are green. This is true of any well-established extant market.

The problem of new markets, however, is not so simple. The Coca-Cola company found that out the hard way when it tried to introduce New Coke. As several scholars have pointed out, the creation of new markets is fraught with incomplete information – and that is putting it mildly (Denrell et al., 2003). Even if we take demand as exogenous and relatively stable, there appears to be an infinite number of ways in which extant demand can be met through technological progress and institutional evolution. And if we throw in endogenously changing preferences into the mix, the problem quickly becomes intractable.

Yet entrepreneurs and managers have to deal with the problem of new market creation. Furthermore, they often have to deal concurrently with the creation of new markets and surviving in existing ones. March (1991) captured that trade-off as the relationship between exploration of new possibilities and the exploitation of old certainties:

Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution. (March, 1991: 71)

The essence of exploitation is the refinement and extension of existing competences, technologies, and paradigms. Its returns are positive, proximate, and predictable. The essence of exploration is experimentation with new alternatives. Its returns are uncertain, distant, and often negative. (ibid.: 85)

A large number of empirical studies of the creation of new markets attest to the uncertainty, time lags and failures inherent in the process. The literature on diffusion alone includes almost 4000 studies (Rogers, 2003), and attests to the fact that most new markets are unpredictable *ex ante*, and take a long time to come to be, if they ever do (Gort and Klepper, 1982).

So, if we ask how an entrepreneur starting a new venture, or a manager in a large corporation, can act on the problem of new market creation, the predominant answer today consists of some form of exploration of the universe of possible markets. In other words, if the emeralds are not green, they have to be some color other than green – blue, for example – the other color being drawn from the spectrum of all possible colors. Even though the spectrum may consist of an infinite number of colors, and cognitively bounded creatures may explore only a small portion of the spectrum at any given point in time, it is still possible to create new markets through a process of exploration – search, variation, risk taking, experimentation, play, flexibility, discovery, innovation, and so on.

For example, Bala and Goyal (1994) postulate that new markets are constantly ‘opening up’ because of technological, political and regulatory changes, and that the emergence of the new market then depends on the

expectations of entrepreneurs and their requisite attempts to enter the market. In fact the rhetoric of ‘entry’ pervades a substantial portion of the growing literature on new market creation – see, for example, Geroski (2003). Miller and Folta (2002) take a similar view when they describe a firm’s decision to enter a new product or geographic market in terms of purchasing an option on involvement in the market.

In the final analysis, either new markets *exist* in some theoretical sense and firms enter them through a variety of exploratory strategies, or new markets *emerge* as a result of technological and institutional evolution of populations of firms engaged in adaptive processes of exploration and exploitation within a changing competitive landscape. It is this ‘big-picture’ philosophy of a pre-existent universe of all possible markets as the micro-foundation for action that I wish to re-examine.

In particular, I postulate a new microfoundation based on the reformulation suggested by Nelson Goodman (Goodman, 1983: 57):

We have come to think of the actual as one among many possible worlds. We need to repaint that picture. All possible worlds lie within the actual one.

5.1.1 A Brief Definition of Grue

In his provocative book *Fact, Fiction, and Forecast*, Nelson Goodman introduced what he termed ‘the new problem of induction’, referring to David Hume’s original problem of induction (Hume, 2001 [1909–14]). Here is a restatement of the new problem.

Take the inductive conclusion, ‘All emeralds are green’. This conclusion is derived from the fact that all instances of emeralds discovered so far have been green. From this we can make the inductive projection that emeralds discovered in the future will also be green. In other words, all emeralds, past, present and future, are, in fact, green. At this point, Goodman introduces the disjunctive predicate ‘grue’, which applies to all those things that are green before time *t* and blue after time *t*. We can set *t* at any arbitrary point, as long as it is in the future – say, 1 June 2080. Inductively we must now conclude that all emeralds that we have observed are not only green but are also grue. In other words, there is as much evidence for the hypothesis, ‘All emeralds are green’, as there is for the hypothesis, ‘All emeralds are grue’. We have no way of refuting this ‘fact’. But by confirming that emeralds are both green *and* grue, we are also confirming the fact that in the future they will be blue (or any other color we choose). As Abrams (2002) puts it:

using what seems to be a standard inductive pattern on a property, i.e., being grue, seems to give us reason to believe that each emerald, somehow, *will* actually turn blue. (Abrams, 2002: 544)

The *grue* paradox, or Goodman's new problem of induction, has been restated and studied in a variety of domains other than philosophy. Take, for example, Akeroyd's (1991) 'A Practical Example of Grue', in which he applies the idea to the relationship between the per centage rate of unemployment and the per centage change of money wage rates known as the simple Phillips curve. In applying it to the creation of new markets, we will begin with a simple illustration.

Let us consider, for example, the case of the commercialization of the internet (Reid, 1997). First, here is a quick look at the chronology: by 1985, the internet was already well established as a technology supporting a broad community of researchers and developers (Leiner et al., 2002). But it was not until 1993 that National Center for Supercomputing Applications (NCSA) released the first alpha version of Marc Andreessen's web-browser Mosaic for X. In 1994, he and his colleagues left NCSA to start Mosaic Communications Corp (later Netscape). Amazon.com launched its website in July 1995. Netscape went public in August 1995, initiating the internet bubble on the stock market. At the time, NASDAQ was still referred to as an OTC (over-the-counter) market, not the 'virtual trading floor' we talk about today. And finally, on 24 October 1995, the FNC (Federal Networking Council) unanimously passed a resolution defining the term 'Internet'.

In terms of Goodman's predicates, we could call the internet before 1 January 1994 (before the launch of Netscape) *r*internet, to signify the fact that it was used mostly by researchers and academics at that time. And the Internet after 1 January 1994 could be called *c*internet, to signify the fact that it was becoming really hot commercial property.

First, from the supply side, how would a founder/developer of *r*internet discover its commercial potential? Secondly, from the demand side, how would a manager at Barnes & Noble discover the potential for retail distribution through the *c*internet? Thirdly, from the standpoint of institutions, how would organizations such as the FNC converge on a definition of the internet that fits both *r*internet and *c*internet? And how would an OTC market such as NASDAQ transform itself into a virtual trading floor on the *c*internet?

It seems almost immediately obvious, given our understanding of markets today, that the actors involved needed to explore *r*internet in order to discover the variety of markets that transformed it into *c*internet. They also needed to stand ready to exploit those new markets if and when they were discovered. As the chronology shows, March's insight that the returns to exploration are uncertain, distant and often negative provides a pretty good explanation of why it took so long for people to discover that *r*internet was also *c*internet. As we know, underlying the worldview of exploration is the philosophy that there already exists a universe of all

possible markets that compete for the winning candidacy – a space of all possible internets, as it were. Furthermore, this space may be so vast and/or so sparsely populated with good solutions that enormous amounts of search and experimentation as well as a large number of dead ends and failures may be required to discover all of them.

But there is another explanation for why Barnes & Noble did not launch the first internet bookstore or why NASDAQ could not envisage that internet was the way to go. And that explanation has to do with the fact that new market creation is an isotropic process, as we saw in Chapter 4. Isotropy, as mentioned there, is the notion that it is not at all clear a priori which pieces of information are relevant to the search for a solution (Fodor, 1987). In other words, a phenomenon that looks *ex post* either like an exploration of all possible internet markets or like the exploitation of the Internet for commercial purposes may instead be the result of a series of transformations of the original reality. In Goodman's terms, the internet, like any other new technology, is *grue* to begin with, and no amount of information can actually specify all possible internet markets before those markets actually come to be. We no more have a way of refuting the fact that *rinternet* is *grue* than we have of refuting Goodman's assertion that all emeralds are *grue*. Furthermore, even after *rInternet* was transformed into *cinternet*, the internet remains *grue*.

The rather mysterious aspect of *grue* in the case of inductive reasoning derives from the fact that there is no mechanism in induction to transform green emeralds into blue ones. This mystery disappears when we introduce human action into the argument. Instead of modeling action as driven by inductive reasoning – i.e. waiting for emeralds to turn blue before we act – effectuation postulates that human action transforms current realities into new possibilities. In other words, an effectual interpretation of *grue* has less to do with the difficulties of induction and more to do with the genuine possibility for human action to intervene causally in the world.

5.2 ACTION IN GRUE MARKETS

The interesting question for us then becomes how a green reality gets transformed into a blue one. How does disjunction *t* happen? Or from a pragmatic perspective, how does one act under the assumption that market creation is a process that transforms extant reality into new markets, as opposed to the assumption that any actual market is one of many possible markets that in theory could be specified *ex ante* and then explored and exploited? And what difference does it make whether we suppose markets are green/blue, or that markets are *grue*?

By now, it is probably clear what my answer will be to the question about how one can act under the assumption of *grue* markets: effectually. The effectuator starts with her current set of means – who she is, what she knows and whom she knows. Her actions consist in things she *can* do and believes are worth doing. One of the very first things she does is interact with other people. Some of those interactions result in commitments to the new venture. But each stakeholder who comes on board brings to the venture both new means and new goals. And each new commitment sets in motions two concurrent cycles, one expanding and the other converging. The entire dynamic process is illustrated graphically in Figure 5.1. The next section first analyses the initial stakeholder commitment and then traces both the expanding network and the converging artifact or new market.

5.2.1 The Effectual Network – a Thought Experiment

To understand how the first effectual commitment initiates the network of stakeholders that transforms extant reality into new markets, I turn to a thought experiment. Although this thought experiment can be generalized to a variety of situations under which new markets come to be, for the sake of precision and clarity, I shall restrict the analysis to the simplest case – i.e. the creation of a new market for a new product, say *Widget X*. (Note that *Widget X* need not be technological. It can be something in nature such as

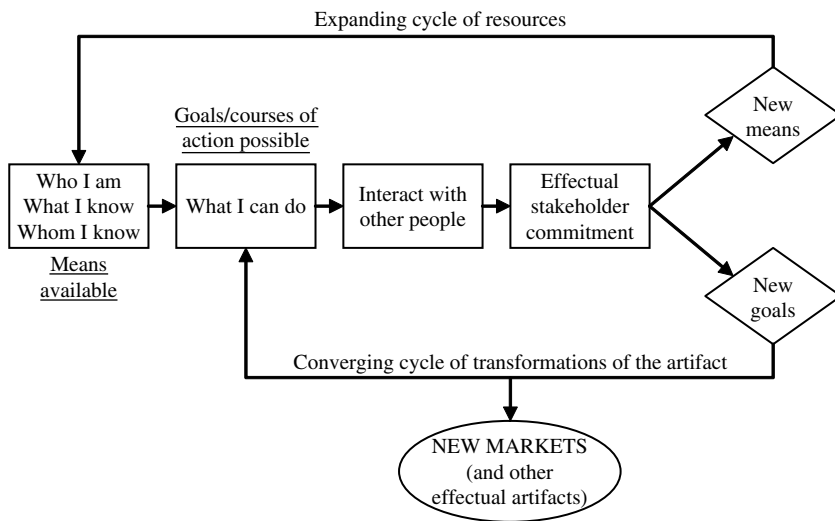


Figure 5.1 Dynamic model of effectuation

a lemon, or it could be a service, a work of art, a minor irritation, a major problem, or an actionable idea.)

The anatomy of the initial commitment

Let us assume Entrepreneur *E* brings Widget *X* to Customer *C* to make a sale. (Later in the analysis, I shall show that *C* can be any kind of a potential stakeholder, such as an investor, a supplier, a strategic partner, etc.) For the moment, it does not matter whether we assume that *E* is proceeding causally (i.e. has found *C* through predictive approaches such as market research) or effectually (i.e. has found *C* through non-predictive mechanisms such as through her existing social network or some kind of a garbage-can process²).

Let us further assume that she wants to sell 1000 units of *X* to *C* at \$100 a piece. Let us now imagine that *C* responds as follows: 'I would gladly buy *X* if only it were blue instead of green'.³

Now *E* has a decision to make. Should she go ahead and invest in making the widget blue – at a cost of, say, \$10 000? There are several criteria she may consider in making this decision. First, she may or may not have the \$10 000 needs to make the modification. Secondly, if she does make the modification, *C* may or may not buy. Thirdly, there may or may not be another customer (say, *D*) who may be willing to pay more than \$100 (say, \$120) per unit for a green *X* – for the widget as is, without any modification.

Assuming that *E* has the money to transform the green widget into a blue widget, she needs a mechanism to help her determine whether *C* is indeed a customer (*T* = True) or is actually a non-customer (*F* = False) who will not buy the modified blue *X*. This mechanism, like any other we can devise, will of course be prone to two types of errors. It may either classify *C* as a non-customer (*F*) when *C* is in fact a customer (*T*) (Type I error), or it might classify *C* as (*T*) when *C* is actually (*F*) (Type II error). Again, assuming *E* has the money to make the modification, there are three possible solutions to this problem:

Solution 1 – persist Using the exploration paradigm, *E* goes in search of other possible customers *D* first. If no *D* exist, then *E* gets *C* to sign a contract that would penalize *C* for not buying the transformed widget.⁴

Solution 2 – adapt *E* invests or raises \$10 000 in expectation of the net profit from *C*'s order. Without an enforceable contract, this expectation is unreliable at best as a decision criterion. But *E* could also do this effectually, using the affordable-loss principle. In other words, she would make the widget blue not with the expectation of any net profit from a potential transaction with *C*, but merely as an investment that she could afford to

undertake (and lose) with imagined possibilities of other uses for the blue widget in case *C* chooses not to buy. In this weakly effectual case, too, this investment is not a reliable one for market creation except in its potential for exaptation (Dew et al., 2004). (See Chapters 9 and 12 for more details on exaptation.)

Solution 3 – negotiate *E* makes the the following counter offer to *C*:

It will cost me \$10 000 to make the modification you desire. I will make the modification if you will invest the \$10 000 up front. In fact, if you will pay for the modification, I will even supply you the modified widget at \$80 per unit, so ultimately you will end up saving money on this purchase.

Note that this solution does not require *E* to search for all possible *D*s before making the counter offer. And this explicit ignoring of opportunity costs is what makes it different from exploration. I shall examine the logic for this in a separate section below.

Let us now consider what *C* must weigh in deciding whether to commit \$10 000 to make green *X*s blue. Like *E* in the decision above, *C* may or may not have the money, *E* may or may not deliver the transformed widget and *C* may be able to find someone else to make the blue *X* for less than \$80 a piece. Assuming that *C* has the money, in the causal case it is obvious that he will invest it with *E* only if no one else can supply blue *X* at less than \$80. Effectuation suggests, however, that he make a counter offer to *E* as follows:

I will invest \$10 000 to transform the green widget into a blue one. But, instead of a discount on the price, I would like to take equity in the venture.

The rationale for this offer could be a belief in a larger market for blue widgets. Or it could merely be the desire to continue to shape the widget in the future.

The two effectual counter offers together transform the relationship into a partnership that commits both to a blue-widget world. Furthermore, in this partnership, both *C* and *E* need to specify blue *X* only to the extent possible at this time, leaving it up for renegotiation as they together develop the product. *E*'s contractual commitment to undertake the transformation signals her private estimation of her own competence, and *C*'s investment identifies him as an actual customer (T).

This final solution to the problem is the strongly effectual one consisting of any mechanism that reduces Type I errors at the cost of incurring Type II errors. In other words, the effectual commitment always favors the error of letting possible customers go as opposed to letting non-customers drive the decision process.

Consequences of effectual commitments

In the above thought experiment I have assumed that *C* knows he is indeed a customer and *E* knows herself to be a supplier. But the effectual commitment would work even if the situation were less clear. Indeed, let us assume that *C* and *E* have high levels of goal ambiguity, with *C* not quite sure that he actually wants *X* and *E* not quite sure that she wants to make *X* – green, or blue, or otherwise. Let's also say that neither knows if there is a market or even a latent market for *X*. By meeting each other and coming up with terms that are doable within the constraints of their current lives, and then actually committing themselves to those terms, they set in motion a chain of commitments.

Each commitment in the chain can be modeled in the same way as the initial one modeled above, except that each new stakeholder negotiates with the venture as it exists at the time instead of with the individual entrepreneur *E* portrayed in the thought experiment above. I shall discuss the development of this chain in more detail later in the chapter. Note that there is no guarantee that this chain of commitments will indeed happen. All I wish to show here is how it *could* happen. Let us now trace the consequences of such commitments actually occurring in the world.

The first consequence is that when two stakeholders make a commitment, they are *de facto* behaving as though the market is *grue* – they are *transforming* green *X* into some specific *X* other than green, including *X*s no one could have imagined before the actual transformation, and not selecting among all possible colors of *X*. In our thought experiment, this transformation happens as follows: by walking into *C*'s office and making the counter-offer based on the effectual commitment, *E* becomes a supplier *de facto*. And by actually investing in *E*, *C* becomes a customer *de facto*. Each did not have to be 100 per cent certain about his or her own potential role until the actual moment of commitment. And even then, the effectual commitment is usually limited to what each party can afford to lose. (More on that later.)

This mutual commitment is the first link in a new chain of stakeholders, the first dyad in a new network that eventually transforms extant reality into a new market. To the extent that Widget *X* is unformed and negotiable, this market is not a phenomenon of *discovery* but of *transformation* leading to the creation of something new, which makes the market for *X* an *outcome* of the interaction between *C* and *E*. Initially, neither party knows what this *X* may or may not be worth down the road, or even whether it will be green or blue or something neither imagines at this moment. The entire process is driven by local and contingent interaction, with the stakeholders prospectively negotiating the very existence and shape of *X*.

The content of the negotiation is not much concerned with the opportunistic potential embodied in the green versus the blue widget (for neither

party knows what this X may or may not be worth down the road or even whether it will be green or blue or something neither imagines at this moment). Instead the content of the negotiation consists in what each would like X to look like and what each is willing to ‘commit’ to make it look like what he or she wants it to be. Thus the set of commitments that defines an effectual network involves agreements to participate in the transformation of an existing widget rather than in agreements to appropriate predicted future payoffs arising from a new invention.

In other words, C and E are negotiating for what X ‘will’ be – not in a predictive sense (although prediction may or may not be part of the reasons for negotiating between green and blue *ex ante*), and not in a social construction sense (although the world may or may not actually come to consist of blue widgets *ex post*), but merely in the sense that both actually invest in a blue-widget world and actually begin making blue widgets. Even more important, their negotiations proceed as though X is *grue* – that is as though X is transformable from green to colors other than green and not as though X is a choice among one of any given set of colors. The actual color, therefore, may or may not be what either had imagined before their interaction at the negotiating table. There is always room for the actual transformation to surprise them with a color neither knew existed.

The point of disjunction for the predicate ‘*grue*’ in the context of new markets is not some arbitrary point t in the future, but the act of commitment by two stakeholders to a particular future X .

5.2.2 A Chain of Effectual Commitments

At this point we can take the discussion back to Figure 5.1 and see how the atomic interaction within each effectual commitment results in the two cycles that increase the size of the network and the resources available to it, and at the same time add constraints to the goals of stakeholders so they converge into the structures of a new market. Also, we can now generalize the thought experiment into a wide variety of new market contexts and iterate it over time. For example, C and E can be angel and entrepreneur, instead of supplier and customer. Or they can be two random entities (individuals or organizations) with problem components and/or solution components that match, resulting in a strategic partnership that then leads to the creation of a new market based on the combined solution they forge. And so on. In general, X can be any component of a market, including demand-side elements such as needs and wants, supply-side components such as technology, product or service, as well as institutional structures of a market such as channel, regulatory infrastructure, standards bodies and so on.

In this general conceptualization of *X*, each new member entering the effectual network negotiates a tiny piece of the future market – a pleasing or meaningful juxtaposition of two or more fabric patches, as it were – and the market that eventually comes to be is like a quilt stitched together by the effectual network as it grows and gradually transforms extant realities into the familiar artifact of the market. In essence, then, new members bring not only certain resources to the venture, including who they are, what they know and whom they know, but also a set of constraints on how *X* can be transformed. In other words, each additional hand that seeks to shape the artifact firms up parts of the clay, as it were, necessitating fewer and fewer transformations. It is this shared accretion of constraints that is eventually embodied in the demand and supply schedules, as well as in the institutional structures of the new market.

At this point, the obvious question of ‘dividing the pie’ or determining each person’s share in the outcomes of the enterprise may arise. Yet this is not a crucial issue in building the stakeholder network I have described above. The effectual nature of the commitment process allows the members of the network to proceed as though the universe at any given point in time consisted only of the people at the table – as though the external world is relevant only to the extent it is embodied in their aspirations and abilities. In other words, the particulars of who they are, what they know and whom they know matter and drive the creation of the final artifact (or pie) that the network ends up with. Stakeholders selecting into the network have to be willing to negotiate primarily for the content and shape of the pie rather than its size and subdivision, especially since they cannot predict what it will eventually turn out to be. And in any case, each effectual stakeholder invests only what he or she can afford to lose.

Sticking with the notion of the ‘pie’ for the moment, only when the dish is done and the aroma begins to waft out of the room do both the issue of opportunism (who gets what piece of the pie) and opportunity costs (what other pies may be ‘out there’) become more relevant. In the interests of uncluttered exposition, I shall examine these two issues – opportunism and opportunity costs – in Section 5.3. Before that I shall examine the transformation of the growing effectual network into a new market as a dialectic between the members of the network and the external world.

5.2.3 The Market as Artifact, or How the Effectual Network Grows into a New Market

As the effectual network grows over time and includes more and more of the external world, it tends to become less effectual as it eventually coalesces into an empirically distinct new market. That transformation can be

modeled as a dialectic between members already on board and the outside world. This dialectic between an inner environment and an outer one is reminiscent of Simon's key insight in *The Sciences of the Artificial*.

Simon (1996) described the artifact as lying on the thin interface between the inner environment and the outer environment. As all things artificial, the market created by an effectual network too eventually becomes a dialectic between inner and outer environments through which each comes to resemble the other in important ways – just as shovels are designed to take the shape of the earth they need to scoop up at one end and the hands that hold them at the other.

The new market, however, is fabricated not through the designs of any one person, but through a chain of interactive commitments that forms the interface between the inner environment of the effectual network (current members) and the outer environment (current non-members). At any given time, the effectual network is impacted by one of three factors: interactions that become embodied in actual additional commitments; those that do not; and non-negotiable exogenous states of nature. The artifact – the new market – is the result of how the network deals with each of these.

Category 1: interactions that become embodied in actual commitments

We have examined this category in great detail in the thought experiment. In sum, interactions that become commitments determine new membership in the effectual network as well as the initial shape of the artifact and its transformations into particular market structures. And as we saw earlier, the effectual network proceeds for the most part by ignoring the external world, except in so far as the external world is embodied in its members. As the membership increases, however, there is less room for transformational negotiations with newcomers. Eventually, the network reaches a point where new members have to take most of X as they find it, or forgo membership in the network. At around this point, interactions that do not become embodied in actual commitments carry vital information about the survival of the new market.

Category 2: interactions that do not become embodied in commitments

Each negotiation that does not result in a commitment signals one of two possibilities. Either there are significant transformations yet to be negotiated to fabricate the new market, or there are alternative markets or other effectual networks that may eventually coalesce into markets that compete with and dissolve the nascent market being formed by the effectual network under consideration. In other words, while each commitment transforms current reality into features of a new artifact, rejected commitments point to bounds for the transformation and signal finite alternatives to be explored.

Members of the effectual network can respond to these kinds of interactions in one of three ways:

1. They can ignore them and continue to build the network effectually. (Transform)
2. They can begin exploring alternatives to growing the network effectually. (Explore)
3. They can declare the effectual transformation complete and begin competing with alternative markets. (Exploit)

In any case, there comes a point in the transformation process when the effectual network has coalesced into a market – i.e. when the continual effectual churn at its outermost edges tapers off and barriers get shored up around its key components. Once the chain of commitments has converged into a distinct new market, at least for a reasonable length of time, the effectuators need to craft and implement strategies based on the exploration–exploitation paradigm. This transition can either occur naturally as the effectual network converges to a new market, or can be actively determined by members of the network in light of competitive networks in the making. How this transition actually occurs in the creation of particular markets is a matter for future empirical investigations.

Category 3: events completely exogenous to the process

This brings us to the final piece of the dialectic between effectual network and outer environment – namely, the part that is completely exogenous to the process. This could consist of shocks (positive or negative) such as those in the macroeconomic/regulatory environment or in the technology regime, as well as some kind of internal contingency such as the exit of a key member of the network. In the event of such contingencies, complete and cascading failure of the effectual network may be unavoidable, just as explosive growth of the new market may become possible. In any case, such contingencies call for a certain amount of responsive reshaping of the artifact in question. To the extent that the collective imagination of the network internalizes and leverages these contingencies as input into the shape of *X*, the network will continue to grow and coalesce into the stable artifact of a new market.

5.2.4 A Summary of the Dynamics

I began developing a dynamic model of effectuation by thinking through an alternative philosophical basis to the exploration–exploitation paradigm for the creation of new markets. This dynamic model, graphically

represented in Figure 5.1, illustrates how an entrepreneurial actor begins with who he is, what he knows and whom he knows, and sets in motion a network of stakeholders, each of whom makes commitments that on the one hand increase the resources available to the network, but on the other, constrain future sub-goals and goals that get embodied into particular features of the artifact. Assuming the network keeps growing and is not dissolved due to exogenous shocks or fatal conflicts within its ranks, the pool of constraints converges into the new market. At the heart of this dynamic model is the notion of an effectual commitment, which has several characteristics:

1. It focuses on aspects that are controllable about the future and about the external environment, irrespective of their predictability, and it eschews predictive information that cannot be encapsulated into controllable aspects.
2. Each effectuator commits only what he or she can afford to lose, and not what may be calculated as necessary to achieve target returns or outcomes.
3. The goals of the network are determined by those who make actual commitments and what they negotiate; pre-existent goals do not determine who comes on board.
4. As means available to the network increase, goals become more and more constrained. In other words, what the artifact can look like becomes solidified over time even as many ways of making it look like what the stakeholders want it to be become possible.
5. The key to the process is not *selection* among alternatives (be they alternative ends or means), but the *transformation* of existing realities into new alternatives.

5.2.5 When Markets are Grue: Transforming rinternet into cinternet

I emphasized earlier that the point of disjunction for the predicate grue in the context of new markets is not some arbitrary point t in the future, but the commitment by two stakeholders to a particular future X . And then I showed how that initial commitment sets in motion an effectual network that grows even as it transforms extant realities into a new market. Such a commitment in the history of the internet can be located in the partnership between Jim Clark (founder of Silicon Graphics) and Marc Andreessen, who wrote Mosaic, the first web browser. That commitment launched Mosaic Communications Corp, which later became Netscape. Three different descriptions of how the commitment came to be are provided below. They are taken verbatim from a historical account by Reid, an anecdotal report on

a Stanford University website and a newspaper article published in *USA Today*:

Reid (1997)

In early 1994, Bill Foss loaded Mosaic (the world's first web browser created by Marc Andreessen) onto his computer and watched as Jim Clark clicked his way through the internet. As Reid (1997) describes it: It was Clark's first glimpse of the Web. Before he was done, he e-mailed Marc. You may not know me, but I'm the founder of Silicon Graphics, his message began. Reid goes on to explain that the first few meetings between the two men did not go very well: Foss remembers Marc as 'this kind of ungainly twenty-two- or twenty-three-year-old kid [who] doesn't quite know what to make of this corporate culture, so he's put a tie on' (ties were passenger-pigeon rarities in the corridors of the company Clark had founded) . . . But . . . Marc 'kind of built up his comfort level with Jim' over the subsequent weeks, Foss recalls.

Stanford website

Clark left Silicon Graphics in January of 1994 with the vague intention of starting a new software company, perhaps involving interactive television. Near the end of his time at SGI, colleague Bill Foss showed Clark a new program he had found. That program was Mosaic. Clark was smitten, and he took note of a Mosaic page showing Andreessen and where he was. Clark contacted Andreessen and the two met, with excellent results. 'He was one of the sharpest people I had ever run across', Clark told the *San Jose Mercury News*. And Andreessen's reaction to Clark, 'His vision, knowledge about markets and ability to execute were right on target'. The two discussed various business opportunities and developed no sure-fire money-making idea, but in the end Clark's entrepreneurial spirit could not be checked. 'You think of something to do,' Clark instructed Andreessen, 'and I'll fund it'.

For Andreessen, there was no reason not to join forces with Jim Clark. Friction had been building between the NCSA management and the Mosaic programmers for several months, and Andreessen was looking for a way to get out. Management issued glowing press reports about Mosaic, but declined to mention Andreessen or the other programmers in any great detail, thus preventing them from receiving the accolades which they were due. In essence, the young team of Mosaic programmers saw themselves as underpaid, under-appreciated and overworked.

Andreessen soon left the NCSA to found Mosaic Communications Corporation. Shortly thereafter he sent e-mail to his former colleagues: 'Something's going down. Be ready to move'.

The company was born.

Maney (2003) – in *USA Today*

At NCSA in 1993, Mittelhauser and Totic recall, Andreessen got fed up with battles over Mosaic, so he left for Silicon Valley. 'Marc was like an ongoing soap opera,' Totic recalls. 'He got this pathetic job where he was, like, an intern, and he was e-mailing us daily dispatches. Then one of them said that he'd met Jim Clark. We were all like, "Who's Jim Clark?"'

In one of those small but pivotal events in history, Bill Foss, an assistant to Clark at computer maker Silicon Graphics, then one of the Valley's most exciting

names, had told Clark he should e-mail Andreessen. Foss had followed Mosaic and knew Clark was casting about for another company idea. But Clark barely knew anything about the Internet. At SGI, he'd worked mostly on the hot field of interactive television. Andreessen was sick of Mosaic and wanted to do something else. 'We had two business plans,' Andreessen says. One was in interactive TV. The other was to build an online gaming network for Nintendo machines.

One day, Clark says, he and Andreessen were in Clark's living room, struggling over ideas. Andreessen said he wanted to work with his NCSA buddies but was afraid they'd get recruited somewhere else. 'Right there, in that moment, we said, "Let's reproduce Mosaic,"' Clark says. 'We hopped on a plane and flew to Illinois in the middle of a thunderstorm. We met the [rest of the NCSA gang] at a hotel and recruited them in 24 hours, and suddenly we had a company.' To celebrate, 'We all went to the hotel bar,' Totic says. 'I remember there was a lot of Jägermeister.'

Taken together, the narratives suggest the following facts about the commitment:

1. Both Clark and Andreessen were doing their own thing and did not envision commercializing the Internet. Clark knew virtually nothing about the Internet, and Andreessen knew nothing about business.
2. Foss, who came upon Mosaic and showed it to Clark, did not know Andreessen.
3. Neither Clark nor Andreessen searched for other possible partners before committing to the project – that is, they did not take into account of any *D*, before committing to *C*.
4. Clark and Andreessen were not part of the same social network. Even after Clark and Andreessen met, they did not quite trust each other and had to work at building a relationship.

The exposition thus far has explained how an initial effectual commitment sets in motion a network of stakeholders that eventually coalesces into a new market. This commitment also embodies the point of disjunction in the grue nature of new markets as opposed to an arbitrary point of time *t* in Goodman's formulation. The remainder of the chapter is devoted to understanding the role of opportunism and opportunity costs in this crucial moment of transformation in grue markets.

5.3 OPPORTUNISM AND OPPORTUNITY COSTS IN A GRUE WORLD

At the beginning of the analysis of the effectual commitment, I posed two questions. First, how can an entrepreneur act in a grue world as opposed

to a green/blue world? And what difference does it make whether she acts as though she is selecting from one of many possible markets or transforming existing realities into new markets? I have analysed the first question in great detail and illustrated that the key difference lies in ignoring opportunity costs – i.e. not exploring beyond the first effectual commitment and letting the growing network of stakeholder commitments determine what the new artifact will be.

We can postulate that each commitment consists of two parts that go hand in hand in both worldviews: the commitment to X , the artifact, and the commitment to C , the network. The pivotal difference between the grue *Weltanschauung* and that of green/blue is that in the grue world, the commitment to C trumps the commitment to X . In the green/blue world, the entrepreneur first commits to a vision of the new market – that is to X , and that vision then drives which stakeholders he or she seeks to bring on board. Both X and C in the green/blue world are chosen through processes of exploration – searching the space of possible alternatives (under standard assumptions of bounded rationality). The question in this case has to do with when and how the search is brought to a halt. Presumably, the answer depends on the stated goals of the enterprise. Criteria for evaluating alternatives are developed on the basis of performance goals, and selection may be based either on standard net present value calculations or some form of real-options logic.

In the grue world, the commitment to X , of course, is always tentative, always subject to change through the terms negotiated by new stakeholders. Perhaps the grue artifact X is more usefully conceptualized as a series of transformations x_p , rather than as any one X . The commitment to C , however, is substantial and very real, as C will have a voice in future stakeholder interactions. Furthermore, the commitment to C not only involves actual commitments to particular transformations of X but also involves an explicit precommitment *not* to explore alternatives D before transforming X . It is this binding constraint of limiting oneself to the bird in hand with regard to stakeholders that clearly distinguishes action in the grue world from decision-making in the green/blue world. Now the question for the grue world at the point of commitment to any particular stakeholder becomes, ‘Why are opportunity costs with regard to other possible stakeholders ignored?’

A textbook definition of opportunity cost would calculate the cost of an action A as the value of the alternative opportunity O that is given up in choosing A over O (Jensen, 1982). Buchanan, however, whose *Cost and Choice* (1979) is acknowledged as the canonical analysis of opportunity costs, is a bit more nuanced:

You face a choice. You must now decide whether to read this Preface, to read something else, to think silent thoughts, or perhaps to write a bit for yourself.

The value that you place on the most attractive of these several alternatives is the cost that you must pay if you choose to read this Preface now. This value is and must remain wholly speculative; it represents what you now think the other opportunity might offer. Once you have chosen to read this Preface, any chance of realizing the alternative and, hence, measuring its value, has vanished forever. Only at the moment or instant of choice is cost able to modify behavior. (Buchanan, 1979: vii)

Yet I have argued above that the effectual entrepreneur explicitly ignores the value of D and brings C on board purely on the basis of C 's commitment to transform X and thus to fabricate a piece of the new market. Since each effectual commitment involves a commitment both to a transformation of the artifact X , and to a specific stakeholder C , we shall now look at each in turn.

5.3.1 Committing to X : the Problem of Means and Ends

By keeping motivations completely unconstrained in my analysis, I am in full agreement with Buchanan that choice-influencing opportunity costs are entirely subjective. In other words, exactly how particular individuals calculate the values of their alternatives *ex ante* and whether they calculate their expected opportunity costs at all is irrelevant to our analysis. What is relevant is the assumption that effectuators see X as transformable and not predetermined.

In a green/blue world, alternatives matter differently than they do in a grue world. In the former, alternatives are searched for and drawn from a universe of all possible alternatives – in this world, the commitment to X is a commitment to X as the goal of action, and resources are allocated among alternative means to achieve that goal. In the latter, alternatives are envisaged as possible transformations of existing realities – the commitment to X is a commitment to a certain course of action x_i which may or may not lead to any envisioned X .

In this regard, my position on ends and goals may be worth clarifying. My analysis is consistent with the fact that goals exist in hierarchies (Simon, 1964). And although goals at the highest levels might be clear, their operationalizations at lower levels may be highly ambiguous. Take for example the goals of an entrepreneur who may want to make \$40 million by age 40. This 'goal' may appear specific and clear, but it is not easily translatable into immediate sub-goals that can actually be acted upon. In other words, the goal does not provide a compelling reason for the entrepreneur to commit to any particular X . In this sense, an actor may experience high levels of goal ambiguity even in the face of a clear vision of what he or she wants down the road.

This analysis is also consistent with questioning the assumptions that underlie the idea that human action can best be understood as the pursuit of preconceived goals. As Joas observes, some of the greatest thinkers of the twentieth century, including Dewey, Heidegger, Merleau-Ponty, Wittgenstein and Ryle, have challenged those assumptions, arguing for:

[t]he impossibility of defining human life as a whole in terms of chains of means and ends . . . If we summarize these admittedly quite discrete arguments showing the limited applicability of the means–ends schema, we find that neither routine action nor action permeated with meaning, neither creative nor existentially reflected action can be accounted for using this model. (Joas, 1996: 156)

Instead, Joas locates human action firmly within the continual interaction of the human body (corporeality) with the real world (situation) and with other people (sociality):

The means–ends schema cannot be overcome until we recognize that the practical mediacy of the human organism and its situations precede all conscious goal-setting. A consideration of the concept of purpose must ineluctably involve taking account of the corporeality of human action and its creativity. (Ibid.: 158)

In a green/blue world, the choice of ends precedes the choice of means; in a grue world, as we saw in the case of the effectual network, ends are outcomes of action that depend at any given point in time on particular actors, and the immediate transformations to which they commit.

In terms of our analysis of grue markets, we need to consider two sets of goals, those of individual members, and those of the effectual network. While individual members may have a variety of goals in different hierarchical schemes with different levels of ambiguities, the network's goals are always particular transformations of *X*. Therefore, only those individual goals would be relevant to the analysis that any given member can embody in particular transformations of the extant artifact.

A lucid illustration of this in a completely different context can be found in Lindblom (1959). When lawmakers sit down to draft a bill on, say, partial birth abortion, their prior positions on the issue are relevant only to the extent that they agree or disagree about particular provisions of the bill, sometimes only to the extent of individual clauses. Therefore, even arch opponents on principles can come together at the margin on particular provisions and end up with a bill both sides can live with. And those who may be ambivalent at the level of principles can commit to particular provisions without first resolving their confusions about the larger issues. Similarly, for this analysis, we do not need to make any precise assumptions about

individual preferences and goal clarity. Only the actual commitments the stakeholders make to particular transformations of *X* drive the fabrication of the new market. Reasons for making commitments may range from pre-existing preferences to docility, passions and convictions to self-interest and fun, reformatory zeal to indifference.

Furthermore, each individual commits only what he or she can afford to lose to make those particular transformations. This is especially true in the initial stages of the network since it is far from clear what *X* will eventually turn out to be, let alone what it will be worth. Therefore, any calculations of expected return, even if carried out by members of the network, can be considered highly speculative at best. Effectuators tend to focus instead on the downside – how much they are willing to lose. This calculation of affordable loss need not depend on any predictive assessment of the value of *X*. Instead, it can be based almost entirely on a variety of things that effectuators already know, such as their current net worth, reliable sources of future income streams, personal expense requirements, commitments already made to others, and so on. Making a commitment based on affordable-loss calculations minimizes (and can even eliminate) reliance on predictive information.

A similar non-predictive logic undergirds the ignoring of opportunity costs in the commitment to *C*.

5.3.2 Commitment to *C* and not *D*: the Problem of Opportunity Costs

The key to the effectual commitment is the reduction of Type I errors even at the cost of Type II errors – that is not allowing non-customers to drive the transformations on *X* even at the cost of overlooking other potential customers. This precommitment to Type II errors does not predict but actually sorts prospects into customers and non-customers, or more specifically, into stakeholders and non-stakeholders. Each stakeholder comes on board the network by actually committing to and investing in particular local shapes and features of the emerging new market, subject to the constraints of everyone else already on board. In other words, new members either reshape the market to the extent they can persuade others to change their views or reshape their own preferences to the extent they are persuadable toward the views of others. Notice that I am not suggesting a new ‘charisma’ theory of entrepreneurship, although some members of the network may indeed be more charismatic than others. Instead, I rest my claims on the fact that *all* human beings, leader and member alike, are (to varying degrees) persuadable (Simon, 1993a).

Membership in the effectual network is not determined on the basis of who ‘should’ come on board but by who ‘can’ given the global constraint

of transforming a grue reality into a new market and the pool of local constraints that have been negotiated thus far. Some of these constraints are lumpier than others. For example, any non-reversible investments such as those involved in R&D or plant and machinery may reduce the fluidity of the pool and lower its ability to blend in the contributions and constraints of potential new members. Eventually some lumpy constraints coagulate into a stable local structure that forms a non-negotiable part of the new artifact. New members now have to negotiate with this stable structure as a single unit, and new pools of contributions and constraints have to evolve around this structure, forming hierarchies of stable structures in the growing artifact. This peculiar structural feature of the effectual artifact called ‘near-decomposability’ by Simon (1996) is crucial to enduring artifacts and will be discussed at some length in Chapter 7.

Through each of these stable structures, within the constraints outlined, the effectual network seeks to control the shape of the future to the extent it is controllable through human action. In other words, the effectual network, especially in the initial stages, does not have any global criteria with which to evaluate the worthiness of any particular prospective member. New membership is contingent on actual local constraints negotiated with current members. A negotiation that results in actual commitments is the *only* criterion that determines membership. Therefore the notion of any objective opportunity costs to membership selection is largely irrelevant because selection in an effectual network is very much a process of *self-selection*. In this way, the rejection of opportunity costs with regard to *D* also rejects the notion of the actual market being one of many possible markets and incorporates the overall grue *Weltanschauung* in which new markets are made from existing components in the actual world.

In commonsense terms, the decision to ignore *D* is a function of the uncertainty associated with the market for *X*. If *D* exists and is known with reasonable certainty to be a customer or supplier for *X*, then it would not make sense for *C* and *E* to proceed as though *D* does not exist. But in most new markets, there is considerable uncertainty regarding the existence of *D*. This is where the effectual logic underlying the network becomes manifest and relevant. Assuming that *E* is already involved in the creation of green *X* and *C* is already interested in blue *X* (for reasons irrelevant to our analysis as I showed in the previous section), we can consider two cases:

- Either *C* and *E* can proceed causally – as though *there exists* a market consisting of *D* for *X* (green and/or blue) largely independent of their particular decisions, in which case they will need to align their choices with the substance of this market. Ergo, they need to invest in search

processes for finding *D* – the best possible sources for customers of green *X* and suppliers of blue *X*.

- Or they can proceed effectually – as though the market is a *result* of particular actions they take, subject to the possibility of exogenous shocks and the need to modify their prior selections as the market comes into existence. In this case, they can proceed with their commitments knowing that they may have to renegotiate the shape of *X* if *D* exists and is willing to commit whatever is necessary to come on board later.

So while the market in which *D* comes on board and the one in which *D* does not would be very different from each other, there is no a priori way to decide which of those two markets would be *better* for *C* and *E*. Instead it makes sense for them to negotiate with any and all members who actually make commitments. In sum, the *calculable* opportunity costs of not partnering with *C* always outweigh the *incalculable* opportunity costs of not partnering with imagined *D*s. Effectually speaking, the bird in hand is always worth more than imagined birds in mythical bushes.

So far, with regard to the commitment to *C* and not *D*, I have shown the irrelevance of opportunity costs in the formation of the effectual network. But what about opportunism?

5.3.3 Commitment to *C*: the Problem of Opportunism

The above analysis is fully consistent with social network theories on the role and salience of existing ties for each stakeholder in the effectual network. This is reflected in the fact that effectuators begin with who they are, what they know and whom they know. But in line with a grue universe, my analysis goes beyond the idea that extant networks can be leveraged and managed to encompass the notion that new networks can also be initiated and developed. I use a simple typology of how new networks may be initiated:

- Networks may form through random chance (example: two or more people bump into each other at the mall or happen to sit next to each other on an airplane).
- Networks may form in some path-dependent fashion (example: through garbage-can processes). These can be intentional or unintentional.
- Networks may form through the deliberate activation of an existing network – again either with regard to achieving a predetermined goal (causal initiation) or by imagining ways to exploit an extant network (effectual initiation).

The history of new market creation is full of unusual partnerships leading to the emergence of new networks. Instead of arising naturally as a consequence of existing social networks, several of these seminal relationships began through unplanned encounters or serendipitous events, such as the one in which Clark and Andreessen, the founders of Netscape, met. Josiah Wedgwood, too, was introduced to Bentley through his physician while he was laid up in bed in Liverpool for many weeks with a knee injury. As a historian describes it, 'This meeting was a fortuitous one for both men. It inaugurated a long friendship of great depth and intimacy, as well as one of the most important business partnerships of the eighteenth century' (Koehn, 1997: 33).

But the idea of initiating new networks begs the question about the role of social networks as the primary arbiters of trust in exchange relationships. Current theories of economics and organizations wrestle with the contradictory behavioral assumptions of opportunism and trust. Opportunism, defined as self-interest seeking with guile (Williamson, 1985), is a fact about human behavior, as is trust, defined as affect-based belief in moral character (Wicks et al., 1999).

Sociologists have tried to leap across this divide by positing a *tertius gaudens* of one kind or another who, through his/her position in a social network, acts as an arbiter of trust and legitimacy between two opportunistic parties. Coleman (1990), for example, identifies the entrepreneur as an arbiter of trust, while Olson (1986) points to the government as the *tertius gaudens* of ultimate resort.

On the basis of a detailed review of the vast literature on this subject, which I will not present here, I conclude, in line with several scholars in the field (Ghoshal and Moran, 1996; Moschandreas, 1997; Rabin, 1998; Simon, 1993a), as follows: both the volume of theorizing and the weight of empirical evidence suggest that it might be fruitful to move away from strong behavioral assumptions of either opportunism or trust-based ties toward a more realistic starting point – namely, that in most cases at the beginning of a network's formation, actors simply cannot predict the motives of those they interact with nor can they always predict their own motivations. That is why it makes sense for effectuators to rely on actual commitments rather than on predictions based on past behavior or promises endorsed by third parties.

Only those who make actual commitments become members of an effectual network. This provides a substantial deterrent to free-riders and opportunists. Furthermore, by requiring a large amount of willingness to change the shape of *X* without guarantees of larger shares of the eventual pie, the effectual network tends to select out opportunists and select in intelligent altruists, including those who persuade others to be altruistic. Also,

opportunists have real opportunity costs in the form of other more predictable markets with low-hanging fruit (as opposed to those under construction through effectual networks). Joining and working with an effectual network requires them to forgo those other opportunities that provide more immediate and surer gains. To a great extent, therefore, effectual networks eradicate the need to overcome opportunism by merely making it irrelevant to the creation of new markets.

Note that this does not mean that members of the effectual network who behave in an intelligently altruistic fashion in the beginning will not behave opportunistically as the market coalesces into more predictable outcome distributions. All that the effectual network does is cue in intelligent altruism at the earlier stages, leaving open the possibility of opportunistic behavior later on. This is very much in keeping with an evolutionary explanation for the concurrent existence of opportunism and altruism in human behavior (Thompson, 1998).

In Chapter 9, I shall explore in more detail the fundamental behavioral assumptions on which an effectual logic is based. I shall then show that effectuation makes *even-if* assumptions, rather than the *as-if* assumptions underlying causal logics.

5.4 WHY THE DYNAMICS OF AN EFFECTUAL LOGIC MATTER

I started out trying to explicate how an entrepreneur/manager can act in a world where markets are *grue*. I showed that forging a network of stakeholders based on actual commitments to particular transformations of extant realities to fabricate components of new markets entails an effectual logic – that is, a logic that allows who comes on board to determine what the new market will look like, rather than predicted visions of the new market driving the search for and selection of new members. I end with modified excerpts from Sarasvathy and Dew (2005b) as to why acting as though the world were *grue* matters.

A number of scholars in evolutionary economics have articulated the necessity for developing rigorous and useful microfoundations for the discipline (Dosi, 1997; Loasby, 1999). They contend that there is no theory of entrepreneurial/firm behavior that is consistent with the basic supply-push story of how new markets are created that has been articulated in evolutionary/Schumpeterian economics (Geroski, 2003; Klepper and Simons, 2000; Rosenberg, 1996a). What emerges from comparing and cumulating the (by now) wide range of empirical studies on new market/industry founding is that the results are inconsistent with the micro-theories

based on which the data were analysed. Some fundamental aspects of extant theories must be seriously mis-specified (Dosi, 2004; Griliches and Mairesse, 1995). In other words, conventional accounts of entrepreneurial/firm behavior (either maximizing or satisficing) do not mesh well with conventional accounts of industry founding. In particular, we have to reckon with at least two stylized facts.

First, consumer tastes are ambiguous/inchoate/ill defined/evolving in new markets. This means the market cannot be found or predicted. Alternatively, even if we take tastes to be reasonably stable, as Lancaster (1971) and Stigler and Becker (1977) model them, consumption technology is changing, i.e. consumers are learning-by-using a technology. Either way, what consumers want is ill-defined, so there is no well-articulated demand, and therefore no market, 'out there', to be found or predicted (Earl, 1998; Geroski, 2003; Langlois and Cosgel, 1993). This challenges both the descriptive and prescriptive theories about firms doing market research to predict and innovate to pre-existent demand. Mowery and Rosenberg (1979) and Dosi (1997) have made compelling arguments against demand-pull theories in general. In sum, these arguments add up to the conclusion that abstract demand does not do much to influence the direction of innovation and the creation of new markets. It cannot.

At the moment, theories of market process have 'black-boxed' this problem by assuming that different entrepreneurs/firms make different guesses about demand (e.g. Geroski, 2003: 46). In other words, we have the tautology that variation causes variation. But not only does this not 'explain' much about how new markets come to be; it also is falsified by empirical evidence. Entrepreneurs do not 'leave it' to differences in tastes or behavior to build markets. They work very hard to make tastes cohere and concurrently to embody them into particular transformations in real artifacts. While not all such artifacts may 'succeed' down the road – i.e. while selection and retention over time may well be evolutionary – almost all variations are non-arbitrary. An effectual logic undergirds the creation of systematic variation.

Secondly, the basic evolutionary view is that new markets are pushed up from the supply side based on commercialization of new technology into marketable products. In particular, entrepreneurial firms create an enormous amount of product variation around the initial components of a new technology, i.e. product variation at the birth of markets is large. Different firms do business by bringing different products to the market. The argument that scholars have used so far is that this is a function of the fact that the technology is often new, so it is 'wide open' to innovatory exploration of its various facets, and that consumer tastes are ambiguous (see above) so different firms make different guesses about what consumers really want.

But this ‘explanation’ again ‘black-boxes’ the process by which certain products are developed and not others. From an economist’s viewpoint, why does competition not lead firms to converge very quickly on the same product designs? Or from a sociologist’s perspective, why don’t the few and rare legitimization agencies quickly narrow the field to a few valuable new markets? Instead, what we actually observe is enormous variation. For example, the conclusion from cumulating results of dozens of industry studies over decades is that, ‘There is a sense in which different bakeries are as much different from each other, as a steel industry is from the machinery industry’ (Griliches and Mairesse, 1995, p. 23).

Effectuation illuminates these patterns of variation by showing how bounded rationality, partial knowledge and particular chains of self-selected stakeholder commitments work in concert to stitch together new markets piece by coherent piece. If individuals knew what they wanted (to the degree and precision that a neoclassical economist would like) and/or if the environment maximally constrained what agents could do (to the satisfaction of the die-hard sociologist), new market creation would actually be easier and happen faster than the facts warrant – computational bounds on human cognition notwithstanding.

But stitching together patch by patch, and building coherence commitment by commitment takes the time most markets take to coalesce – 15 years and counting in the case of the internet, for example (other examples: Gort and Klepper, 1982). Furthermore, the effectual logic at the heart of this intersubjective process is empirically observable, theoretically feasible, and prescriptively useful in telling the troops what to do on the ground.

NOTES

1. This paper presents the ideas in this chapter from the standpoint of evolutionary economics, without the philosophical framing that I use here.
2. See Cohen et al. (1972).
3. Of course, the very first *C* may or may not say this, but I assume *E* keeps talking to people she knows or meets until she finds the first *C* who is interested.
4. This contract is psychologically unviable unless *E* and *C* have an ongoing relationship of trust. In the case of an emerging new network, *C* faces two types of uncertainties leading to contractual hazards here: *E* may not be able to deliver the transformed widget as per contracted specifications (unknown competence), or it might not be possible to specify very clearly in advance what exactly *C* wants modified and *C* could find himself in trouble by signing an incomplete contract.

6. Relating effectuation to performance

‘Most firms fail’, appears to be the consensus among entrepreneurship scholars and practitioners alike, even when they disagree on the actual proportions (Aldrich and Martinez, 2001; Fichman and Levinthal, 1991; Hannan, 1984; Low and MacMillan, 1988; Stinchcombe, 1965). Estimates of firm success rates range from the optimistic 44 per cent of Kirchoff (1997) to the widely acknowledged one in 10 of the National Venture Capitalists’ Association. To confound matters further, Headd (2003) found that about a third of closed businesses were successful at closure.

Expert entrepreneurs, however, mentioned and repeated several times in several ways the bromide ‘Failure is not an option.’ It was a predominant theme in the protocols, as pervasive as the distrust of formal market research. It seemed clear that a deeper and more subtle analysis would be required to reconcile the received, although disputed, consensus in the literature that ‘most firms fail’ with the steadfast avowal of the subjects in the study that ‘failure is not an option.’

There were two possible explanations for the expert entrepreneurs’ contention:

1. It could be a case of overconfidence bias, as suggested by Cooper et al. (1988) and Griffin and Tversky (2002); or,
2. It could be driven by an effectual logic.

I began listening to the protocols with a renewed focus on this issue. I also began asking the subjects to explain their statements about failure and success during the interviews following the protocol experiment. Soon, it became clear that the expert entrepreneurs made different assumptions about the event space of probabilities than those we find in the literature on overconfidence and other biases related to forecasting. Furthermore, the expert entrepreneurs had a distinctly instrumental view of failures, including firm failures. This suggested I had to go back to the drawing board and research extant literature on this topic, particularly issues connected with the success of the entrepreneur as distinct from the success of any firm he or she may have founded.

Astonishingly, there were no studies on how the entrepreneur estimates his or her subjective probability of success or failure – not the probability

of the outcomes of any given firm or opportunity, but the probability of his or her success as an entrepreneur. Nor were there any studies that indicate how they ought to estimate such a probability. Instead, the overall practice of the extensive literature on estimating rates of firm success or failure was unwittingly or explicitly to equate the expected success rate of firms with the expected success rate of entrepreneurs. In a nutshell, a detailed review of four fields – industrial organization, population ecology, labor and microeconomics, and entrepreneurship – suggests that entrepreneurial performance is almost always confounded with firm performance.

6.1 SUCCESS OR FAILURE OF THE FIRM \neq SUCCESS OR FAILURE OF THE ENTREPRENEUR

Success rates of firms and entrepreneurs have been studied extensively by a variety of researchers under a number of rubrics: *firm formation and entry* (industrial organization); *organizational founding and survival* (population ecology and organizational theory); and, *entrepreneurial success and failure* (entrepreneurship).

6.1.1 Studies of Industrial Organization

Following a plea by Edwin Mansfield (1962) to encourage econometric studies of the birth, growth and death of firms, a slew of industrial organization scholars began studying the process of entry with a view to understanding its determinants as well as its impact on market performance. In an excellent review of this stream of research, Geroski (1995) summarizes the results as a series of stylized facts on which scholars in the area generally agree. For our particular purposes in this chapter, two facts from this body of work stand out: first, although entry is common, survival is not. In other words, while large numbers of firms enter most markets in most years, survival of new entrants, especially de novo entrants, is low. Second, most markets are subject to enormous waves or bursts of entry in the early stages of their life cycles.

6.1.2 Studies of Population Ecology of Organizations

The above two results from industrial organization are independently supported (at least partially) by organization theorists who use an evolutionary and/or population ecology perspective (Aldrich and Fiol, 1994). Population ecologists have found that success rates of organizations are

age-dependent. As concisely summarized by Henderson (1999), this literature does not always agree on the exact relationship between the age of a firm and its probability of success or failure. While some stress the liability of newness as a key factor in firm failure (Hannan, 1984; Stinchcombe, 1965), others argue that there is an early window of survival due to the initial stock of assets acquired at founding, after which the liability of adolescence takes over and reduces life expectancy (Bruderl et al., 1992; Fichman and Levinthal, 1991). But besides the high probability of infant (or adolescent) mortality, this literature also finds a high probability of failure due to old age when firms tend to become highly inertial and misaligned with their environments (Barron et al., 1994; Baum, 1989).

Neither industrial organization nor the literature on population ecology addresses the success or failure rates of entrepreneurs.

6.1.3 Studies of Labor and Microeconomics

There are at least two stylized facts that emerge from economists' studies of entrepreneurial performance. First, in considerations of firm performance, a variety of studies from Christensen (1971) to Moskowitz and Vissing-Jorgensen (2002) find that returns to investment in the private (non-corporate) sector are not significantly different than those achieved by publicly traded corporations. Secondly, in terms of entrepreneur performance, several studies, such as Blanchflower and Oswald (1998) and Hamilton (2000), find that the earnings of the self-employed are in many instances lower than those of comparable paid workers. This effect is worse when so-called 'star' performers are taken out of the sample of self-employed. Also, this result has been independently verified by business management scholars such as Gimeno et al. (1997). Taken together, these facts present an interesting puzzle as to why people choose to become entrepreneurs and invest their net worth in (presumably) high-risk ventures when they do not stand to gain a substantial premium over less risky investments in public equity markets.

The most likely answer to this puzzle seems to consist in the argument that non-pecuniary benefits matter – all the studies cited above make that case in varying degrees. Furthermore, several of them convincingly rule out the selection argument advanced by sociologists – that less able individuals (or 'misfits') select themselves into self-employment. There is also some evidence that the longer the self-employed remain self-employed the less likely they are to exit entrepreneurship and rejoin the workforce.

Perhaps the most interesting study of the relationship between the two spaces of firm performance and entrepreneur performance is Holmes

and Schmitz (1995), which looks at two types of small business failure – discontinuance through closure and discontinuance through sale – and relates them to the age of the business and tenure of the manager (who may be a founder or not). The study explicitly seeks to separate the manager from the business (*ibid.*: 1007). In particular, it theorizes about two qualities associated with firm failure – one that is characteristic of the business opportunity (as distinct from the manager's abilities) and another that is specific to the match between manager and business. The results of the study can be summarized as follows: most new businesses are of poor quality; the better ones get sold. And of those that are sold, the ones that survive tend to have high match quality between manager and business. In other words, as the authors aver, 'who is managing the business matters' (*ibid.*: 1037). With regard to differences between non-founders and founder managers, 'among businesses of the same age, businesses owned by non-founders of 0–2 years have higher discontinuance rates than businesses owned by their founders (except for the very oldest businesses, those with more than 23 years)' (*ibid.*: 1032). Arguably, then, founders are more likely to have found better match quality in their businesses. Even this lone study that explicitly seeks to distinguish firm performance from manager/entrepreneur performance does not have any data on founder experience – i.e. the number of startups the founder has been previously involved with – and its effect on performance in the long run.

In sum, it is clear that there is much work yet to be done in characterizing and developing a deeper understanding of serial entrepreneurship. In this chapter, therefore, I propose to investigate the role of entrepreneurial experience in the performance of firms and entrepreneurs through the study of habitual entrepreneurs – entrepreneurs who start several firms, some successful and others not.

6.1.4 Entrepreneurship Research

Entrepreneurship scholars do worry about entrepreneurs as well as firms. All the same, it is this literature that espouses the most instrumental view of entrepreneurs. For example, there is a rather large stream of effort in this literature devoted to the traits and characteristics of entrepreneurs and how those affect firm performance. In a comprehensive review of this stream, Gartner (1988) identified a number of studies starting around the middle of the 20th century that focused on the personality of the entrepreneur as a predictor of firm success. He argued for the futility of the traits approach because it sought to separate 'the dancer from the dance' and in over three decades had not resulted in any clear understanding of the phenomena concerned with firm creation.

The traits approach has since been largely abandoned. Recent studies have turned to a more sophisticated understanding of the cognitive biases of entrepreneurs and their ability to garner human and social capital as predictors of firm success. Examples include Baron (2000), Bates (1990), and Busenitz and Barney (1997). Also interesting are studies such as Gimeno et al. (1997), which relate firm survival to factors other than objective measures of firm performance. In particular they find that subjective thresholds of performance based on human capital characteristics of entrepreneurs (such as alternative employment opportunities, psychic income from entrepreneurship, and the cost of switching to other occupations) result in firm survival even in the case of so-called 'underperforming' firms. All the same, the focus on the personality of the entrepreneur as a predictor of firm success is not quite dead, as is evidenced by Brandstatter (1997), Miner (1997) and Rauch and Frese (2007).

The primary reason for the paucity of evidence about the success and failure of entrepreneurs as distinct from firms is that whereas evidence on failed firms is hard to obtain (the data usually disappear along with the firm), evidence on failed entrepreneurs is well-nigh impossible to come by. People just simply do not walk around with business cards that say 'failed entrepreneur'. Most founders of failed firms either dust themselves off and go on to start other firms or are serial entrepreneurs who have previously been successful. Both groups tend not to mention their failed firms except long after the fact, as part of uplifting anecdotes in public speeches. The few truly 'failed entrepreneurs' seemingly disappear off the face of the economy forever, leaving few traces for researchers to follow.

6.2 SERIAL ENTREPRENEURSHIP AS A TEMPORAL PORTFOLIO

The key, therefore, to any investigation of the distinct spaces of firms and entrepreneurs is the phenomenon of habitual entrepreneurs, particularly serial entrepreneurs – those who start several firms, some successful and others not. Although several entrepreneurship researchers (Macmillan, 1986; McGrath, 1996; Scott and Rosa, 1996) have urged the necessity of studying habitual entrepreneurs, very few empirical studies have been conducted and virtually no theoretical development has taken place in this area (Westhead and Wright, 1998). It is clear, however, that serial entrepreneurs account for a substantial (a third or more) of new firms in several countries (Birley and Westhead, 1993; Kolvereid and Bullvag, 1993; Ronstadt, 1984; Schollhammer, 1991).

6.2.1 What Do We Know About Serial Entrepreneurship?

To date, empirical studies involving serial entrepreneurs (cited above) tend to focus either on the differences between novices and habitual entrepreneurs or the effects of experience on the magnitude of firm performance, which so far has been found to be insignificant (Alsos and Kolvereid, 1999). One reason could be that failed firms are a way for habitual entrepreneurs to learn what does and does not work. In other words, if we consider that learning occurs as much through failed startups as through successful ones, learning through serial entrepreneurial experience may not imply a higher likelihood for the success of any particular firm started by the serial entrepreneur. It will only point to a higher probability of success for the entrepreneur measured over his or her career. The proper unit of comparison then would not be novice versus habitual entrepreneurs in their performance with a particular firm, but how particular patterns of failures and successes explain variations in the performance of habitual entrepreneurs over time. For example, one could speculate that entrepreneurs who have experienced at least one success and one failure are more likely to achieve a 'home run' – that is, they are likely to attain extraordinary personal wealth or found a firm that achieves extraordinary growth or both – than entrepreneurs whose very first venture succeeds and survives. For the one-time entrepreneur, the firm is an end in itself, whereas for the serial entrepreneur, each firm, no matter its outcome, is an instrument of learning that enables him or her eventually to achieve better performance.

None of the studies so far investigates the role of firms as tools that help generate and pursue entrepreneurs' ends, whether or not those ends coincide with 'objective' measures of firm performance. Given so many studies that demonstrate the importance of non-pecuniary benefits in entrepreneurial performance, and the growing market for entrepreneurship education nationally and internationally, it may be worth studying habitual entrepreneurship as a learning process rather than as a game of dice. Furthermore, there is some evidence that at least some new entrants design their firms with early failure in mind – as experiments, as it were – to test the waters of potential success in both established and new industries:

To put the point provocatively, we have thought many entrants fail because they start out small, whereas they may start with small commitments when they expect their chances of success to be small. At the same time, small-scale entry commonly provides a real option to invest heavily if early returns are promising. Consistent with this, structural factors long thought to limit entry to an industry now seem more to limit successful entry: if incumbents earn rents, it pays the potential entrant to invest for a 'close look' at its chances. (Caves, 1998: 1961)

It could be argued that serial entrepreneurship is nothing but a diversified portfolio over time, as opposed to concurrent diversification in a normal portfolio. But a little investigation into the features of the two shows almost immediately that they differ in important ways.

1. Concurrent portfolio diversification requires considerable up-front investments, while serial entrepreneurship can begin with investments as low as zero.
2. The most that large portfolios can do is reduce risk, given whatever levels of return may be achieved by the individual management teams in each of the firms. Serial entrepreneurship, on the other hand, allows the entrepreneur to cumulate learning over each firm that he or she helps found and run, thereby leading to increased returns as well as reduced risk.
3. If it is argued that small portfolios such as those held by venture capitalists do provide some upside control, even those portfolios would benefit from the cumulated knowledge and experience of serial entrepreneurs. In a sense, these two approaches to managing uncertainty are non-ergodic – that is, temporal averages are not equivalent to ensemble averages.

In sum, what we do know about habitual entrepreneurship suggests that any serious empirical attempt to investigate this phenomenon is likely to generate interesting questions for scholarship as well as important implications for policy, practice and pedagogy.

6.2.2 Modeling Serial Entrepreneurship as a Contagion Process

We can mathematically model how entrepreneurs can amplify their expected success rates (as opposed to firm success rates) by exploiting contagion processes embedded in habitual entrepreneurship (Sarasvathy and Menon, 2002). The advantages to holding concurrent portfolios that exploit heterogeneity are well known. It can be shown that the same advantages may be achieved in the habitual context through contagion. The model exploits an observation made by William Feller on the near equivalence of heterogeneity and contagion, statistically speaking (Feller, 1968).

Consider what starting multiple firms offers the entrepreneur. If entrepreneurial success really is just a matter of getting a certain minimum number of successes in a multiplicity of trials, then the entrepreneur is relegated to the task of waiting out failure. In this regard, it is useful to compare the habitual entrepreneur's situation with that of the portfolio

manager. The major difference between the two problems is that in portfolio allocation, diversification can be used to ameliorate the risks associated with a fixed level of expected return (Samuelson, 1967). In contrast, the use of heterogeneity (diversity) to average out losses from firm failure is not an option for the habitual entrepreneur; he or she cannot start firms concurrently with the idea of exploiting negatively correlated dependencies between them. To paraphrase a well-known example from Samuelson (1967), it may make sense to buy shares in a coal company and in an ice company but it may not be feasible to start coal and ice companies at the same time.

However, seriality offers a different route to beating the odds: the serial entrepreneur manages to effect the benefits of heterogeneity through contagion. It is a remarkable fact that contagion processes can quite often achieve the same qualitative statistical effects as heterogeneity (Feller, 1943; Taibleson, 1974; Xekalaki, 1983). This 'equivalence' is unexpected because contagion is intrinsically a serial and cumulative process, just as diversification is quintessentially a concurrent and balancing one. Traditionally, the relationship between heterogeneity and contagion has been considered a confounding factor in statistical estimation and hence a nuisance effect. But the confounding actually works both ways: if heterogeneity's effects can produce the appearance of spurious or pseudo-contagion, then contagion can also produce a pseudo-heterogeneity. This explains, intuitively, why contagion is useful for the sequential amelioration of risks. It also explains why there is an entrepreneur required in 'serial entrepreneurship'. Unlike the 'given' set of assets in portfolio allocation, contagion has to be learned, manufactured, designed, discovered, made, constructed, invented and/or fabricated.

Using Polya urn models to analyse the relationship between E-space and F-space (the underlying sample spaces for entrepreneurial performance and firm performance respectively), we can develop empirically sound implications about the size distribution of firms in the economy (Sarasvathy and Menon, 2002). In particular, the analysis led to the negative binomial distribution as the connecting link between E-space and F-space. This was cause for comfort and confidence in the validity of our approach. The negative binomial is the classic contagion distribution, going all the way back to the origins of the subject (Greenwood and Yule, 1920). It is one of the simplest possible distributions that can be associated with Gibrat's law, which forms the basis for other contagious growth distributions such as Zipf's, Pareto's, Geometric and others. The importance of Gibrat's law in economic phenomena such as the size distribution of firms has been amply evidenced by Simon (1955) and Ijiri and Simon (1975).

To summarize:

1. Probabilities defined over E-space may assume different values than probabilities defined over F-space. Accordingly, decision making in E-space is not necessarily identical with decision making in F-space.
2. Serial entrepreneurship can be modeled as a temporal portfolio with contagion effects, leading to the argument that the seriality provides a viable strategy for the entrepreneur to improve his or her own expectations of success, over any given success rate for firms.
3. A population of serial entrepreneurs would look very much like the economy we actually observe empirically – i.e. size distributions of firms in such an economy would conform to Gibrat's law.

But perhaps the most important implication of this analysis is a challenge to the received wisdom that the entrepreneur is an input into firm performance. Both reality and common sense suggest the opposite. In fact, my first major proposition for the relationship between effectuation and entrepreneurial performance is:

Proposition 1: Entrepreneurs can and do use both firm failures and firm successes to increase the probabilities of their own success.

This means that entrepreneurial experience is primarily one of managing a variety of failures and successes. As entrepreneurs become more experienced, it stands to reason that they would learn to manage discrete failures without allowing the firm as a whole to fail. I would speculate, then, that their failures occur at the level of the business model. The above proposition, therefore, can be translated into the following testable hypotheses:

Hypothesis 1a: The more experienced the entrepreneur, the more business model changes we will observe in the firms he or she creates.

Hypothesis 1b: At any level of experience, the more effectual the actions of an entrepreneur, the more business model changes we will observe in the firm he or she creates.

The contention in Proposition 1 has a variety of interesting implications for entrepreneurial learning that must be investigated and developed. For example, according to James March,¹ while failure may increase the entrepreneur's competence, it may simultaneously reduce his confidence. How a serial entrepreneur overcomes this confidence deficit and exploits his increased competence would be one promising avenue of research.

An instrumental view of firm performance also suggests a way for entrepreneurship scholars to pick up the gauntlet that Arrow threw down, namely:

Are we trying to isolate a claim that some particular set of individuals with certain characteristics or particular set of institutions create – distinguish the successes and the failures? And this introduces me to what I call the null hypothesis: That there is no such thing. (Sarasvathy, 2000, p. 14)

Perhaps the surest way to falsify his null hypothesis is to accept it. This is not a paradox. We need only to understand that the null hypothesis does not exclude the possibility that all entrepreneurial individuals and institutions can succeed by exploiting contagion processes embedded in serial entrepreneurship, irrespective of whether the null hypothesis is true for firms.

6.3 FIRM LIFE CYCLE, ENTREPRENEURIAL EXPERTISE AND PERFORMANCE

If entrepreneurs learn from successes as well as failures, it would be interesting to understand how that learning feeds into the development of entrepreneurial expertise and the resultant interactions between firm performance and entrepreneurial performance. It would also be interesting to specify the role that effectuation plays in these interactions. Before unpacking these intricate relationships, it may be useful to examine whether effectuation is a psychological trait.

6.3.1 Is Effectuation a Trait?

I use the term ‘trait’ here to mean a medium-term constant attribute of a person – some aspect of ability or behavior that remains the same over time. In conversations with psychologists, there is usually an immediate temptation to divide the world into ‘causal’ individuals and ‘effectual’ individuals. There may of course be a traits aspect to effectuation. In other words, there may be some human beings who are naturally better at or prefer the use of this logic. At the same time the data do not rule out the argument that expert entrepreneurs may have *learned* to prefer an effectual logic for actions in the early stages of firm formation. Consider the following facts:

- Over 63 per cent of expert entrepreneurs in the think-aloud protocol study preferred effectuation to causal approaches more than 74 per cent of the time.

- However, they were completely capable of using a causal logic in solving some of the problems in the research instrument that had to do with running the enterprise in later stages and taking it public.
- The final piece of evidence comes from the classroom. It is possible to teach the codified principles of effectuation – students are able to learn to draw from both toolboxes (causal and effectual) and evaluate which to use under which circumstances and with what consequences.

I take both positions (the traits aspect and the expertise aspect) into account while developing the ensuing hypotheses relating effectuation to performance. I begin by stating the general proposition first and then operationalizing it in specific hypotheses.

Proposition 2: The career paths of entrepreneurs and the life cycles of the firms they start will depend on and influence their use of effectual logic.

In particular, I would hypothesize that novice entrepreneurs might be all over the spectrum in their use of causal and effectual logics. This could be due either to innate traits and tendencies or to previous life experiences that may or may not include an entrepreneurial component (selling girl-scout cookies, for example). But their use of either of the two logics would be moderated by the resources available to them. In general, when entrepreneurs have few resources, they are forced to use effectual approaches, whether they prefer to or not – necessity being the mother of zero-resources-to-market, so to speak. But as their entrepreneurial expertise grows, one would expect them to become more discerning in their use of appropriate logics for any given situation. Once they become entrenched experts, however, and have a more sophisticated understanding of effectual actions and the world entailed by those actions, they consciously prefer an effectual logic, as the think-aloud protocol data show.

If we turn now to the life cycle of a firm as opposed to the career of an entrepreneur (over one or more firms), I would predict that most enduring high-growth firms, particularly firms that transformed industries and opened up new markets, would have begun effectually. In other words, if we look closely at the early-stage histories of enduring firms, we should be able to trace patterns of effectual actions in their origins. But as they survive and grow, their management will need to become more causal, particularly in exploiting the new markets they have created and building long-term competitive advantages.

It stands to reason then that at some point in the life cycles of these firms, their founders would have to move from a predominantly effectual mode of thinking and action to a causal mode. It is my conjecture that many highly

effectual entrepreneurs will not make that leap easily. Therefore, I would predict either that many high-potential firms will fail when they reach that inflection point or that many founders of high-potential firms will not continue to run those firms in the later stages. To put it another way, only a small proportion of enduring firms will actually be run by their founders. The transition could happen in one of two ways: expert entrepreneurs, after one or more botched attempts, will realize they do not like or are incapable of using causal approaches, and so will either quit or pass the reins to more professional management; or they will be fired by venture capitalists or other major stakeholders and replaced with professional management.

Figure 6.1 incorporates the various implications of Proposition 2 into a single graphic containing six distinct hypotheses as follows:

Hypothesis 2: Although novices may vary in their use of causal and effectual logics, their preferences for effectuation in the early stages of new ventures will increase as they become experts.

Hypothesis 3: Furthermore, both highly causal and highly effectual novices learn to balance causal and effectual approaches during the growth phase of new ventures, before developing a clear preference for highly effectual strategies as their expertise grows.

Hypothesis 4: The more resources available to novices, the more causal their actions are likely to be. In the case of expert entrepreneurs, availability of resources will not affect their use of highly effectual action.

Hypothesis 5: Successful firms are more likely to have begun through an effectual logic and grown through causal approaches as they expand and endure over time.

Hypothesis 6a: Only a small subset of experienced entrepreneurs will successfully make the transition from an entrepreneurial firm to a large corporation.

Hypotheses 6b: Only a small subset of enduring firms will continue to be run by their founders.

6.4 THE PROBABILITY OF FAILURE VERSUS THE COSTS OF FAILURE

Let us now look more closely at the relationship between the use of an effectual logic and the use of resources in the entrepreneurial firm. The essence of effectuation is the use of non-predictive strategies including the affordable-loss principle. In contrast, a causal approach involves calculating

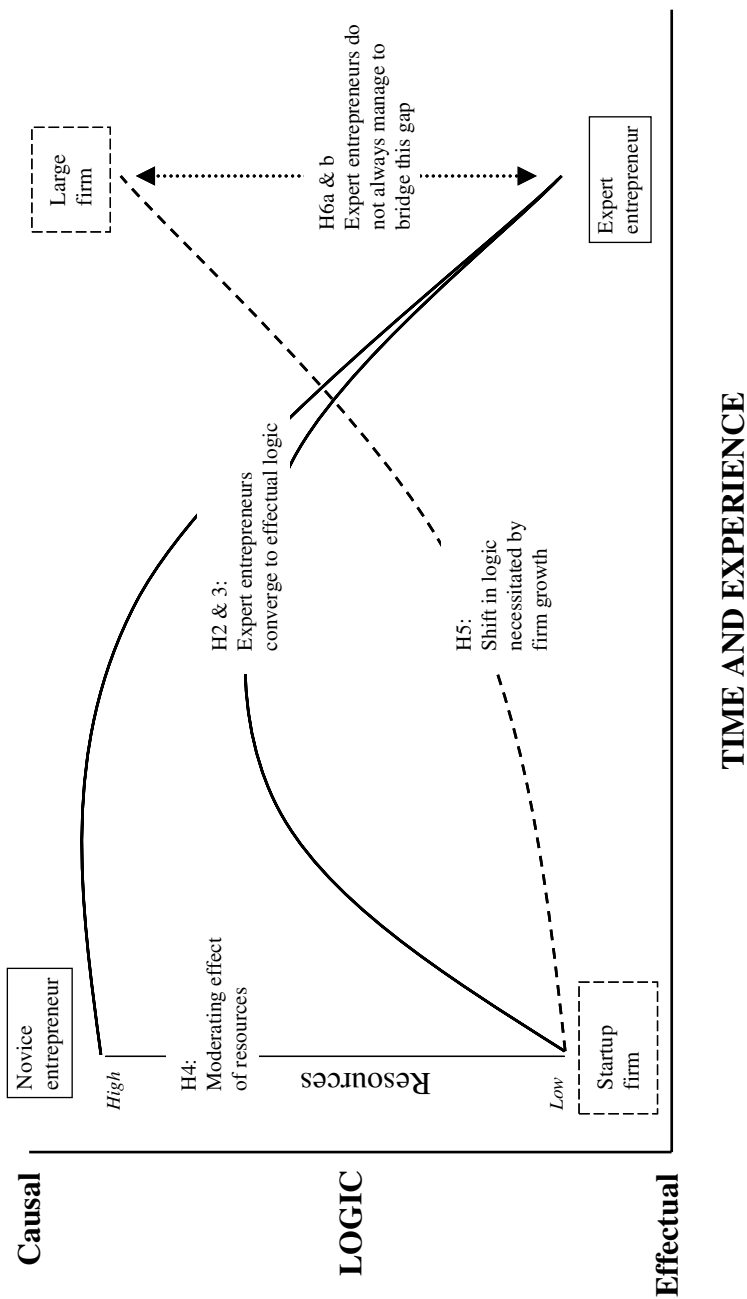


Figure 6.1 Performance implications of causal and effectual logics over the career of the entrepreneur and the life cycle of the firm

the levels of investment required to achieve certain levels of expected return and predicating actual plans and implementation on those calculations.

Figure 6.2 depicts this causal approach as the attempt to predict the shape of the curve showing the actual investment required (AI). This is the S-shaped curve from the marketing literature on the diffusion of new products (Bass, 1969). The argument here is that actual investment has to be some function of how the firm's products get adopted in its market; hence, *ceteris paribus*, the AI curve would look somewhat like the diffusion curve. Of course, all predictions are subject to Type I and Type II errors. So the predicted investment (PI) curve for a causal approach can either overshoot or underestimate the AI curve. This is labeled 'the prediction gap' in Figure 6.2.

The effectual entrepreneur, however, does not try to predict the AI curve. Instead, she invests only what she can afford to lose. Her level of affordable loss grows as the firm grows. Hence the level of investment in the effectual firm is a linear function of time. But this level of investment is unlikely to allow the venture to achieve its potential. The effectual entrepreneur, therefore, faces a control gap – and she needs to make up this gap in investment required through partnerships and alliances with stakeholders combined with creative use of existing slack in the world.

This suggests the following two hypotheses:

Hypothesis 7: When a causal logic is used in building a firm, the level of performance the firm achieves is positively correlated with the predictability of the market for the firm's products and services.

Hypothesis 8: When an eVectual logic is used in building a firm, the level of performance the firm achieves is inversely correlated with the predictability of its market and positively correlated with the number and quality of its alliances.

Note that I have thus far ignored exogenous shocks (represented by the vertical lines in Figure 6.2). In other words, the arguments above are based on the assumption that the firm survives and grows. I have further assumed in the effectual case that the entrepreneur starts with virtually no resources (or is an extreme effectuator who implements the zero-resources-to-market principle).

But it is easy to see, given the assumptions of the argument, that at any given point in time, should failure occur, the effectuator is likely to lose less in terms of investment than the entrepreneur who invests using a causal logic. The corollary to this, of course, is that the effectuator may not make adequate investments in time to exploit a really large or extremely fast-growing opportunity, and therefore may lose out on the upside, to competitors or to other stakeholders. In either case, we can assert the following proposition:

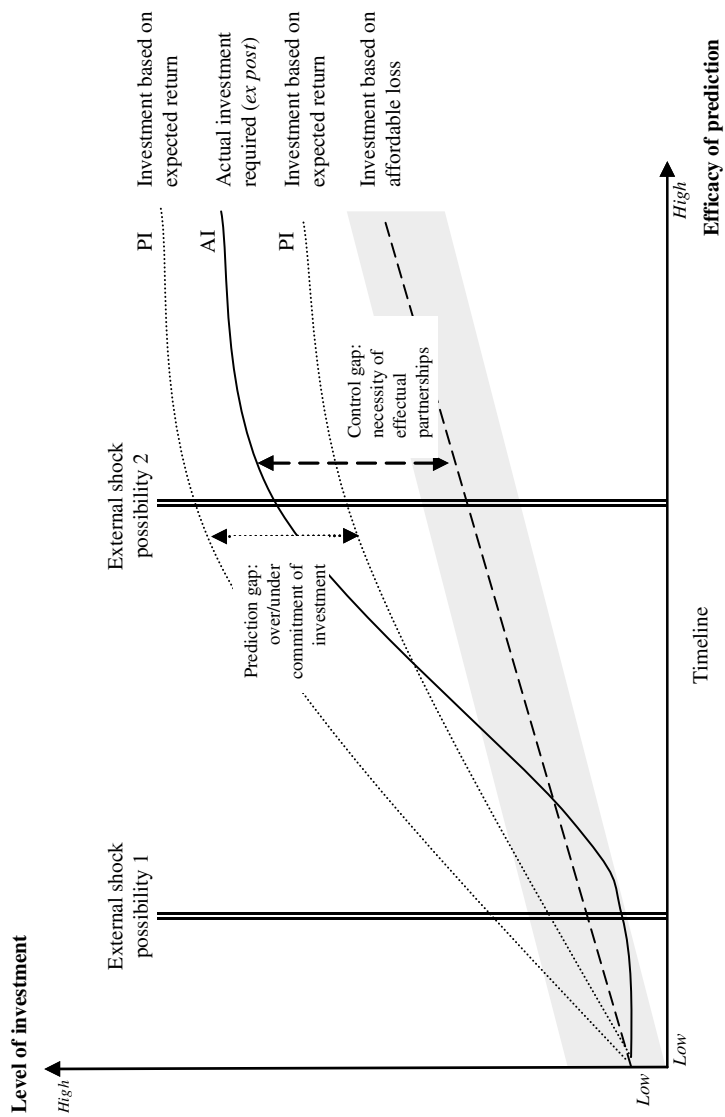


Figure 6.2 Performance implications of causal and effectual logics in terms of investments and external shocks

Proposition 3: Effectuation may or may not reduce a firm's probability of firm failure but it does reduce the costs of failure.

This proposition is true not only for the individual entrepreneur but also, through simple aggregation, for the economy as a whole. Furthermore, the fact that each failure occurs earlier and at a lower level of investment has three positive implications for the temporal portfolio of an effectual entrepreneur. Even if we assume that only small successes are dependent on expertise whereas home runs are drawn from a random distribution, we can argue the following:

1. The effectual entrepreneur gets to explore more opportunities than does the causal entrepreneur. In other words, effectuation gives the entrepreneur more shots at the jackpot – a larger temporal portfolio.
2. The effectual entrepreneur survives longer so she can win the marathons (although she may lose some sprints along the way).
3. The effectual entrepreneur gets to explore opportunities that are better suited for her. Because lower costs of failure mean more experiments, she fully reaps the benefits of cumulative learning and is better positioned to exploit favorable path dependencies.

6.5 BAYESIANISM AS A CONTROL ENGINE RATHER THAN AN INFERENCE ENGINE

So far I have looked at the probability of firm failure as largely outside the entrepreneur's control. But entrepreneurs, particularly effectuators, do not passively accept probability estimates as inputs into their decisions. To put it another way, effectuators are not normal Bayesians in the way they process probability estimates.

At first glance, an effectuator's decision to become a serial entrepreneur as a response to the probability estimate 'most firms fail' illustrates nothing more than the trade-off between the willingness to fail and the pitfalls of prediction. But further investigation shows that how effectuators conceptualize Bayesianism is of considerable philosophical and pragmatic import. In particular, an effectual logic turns the spotlight on how sensitive probability assessments are to their conditioning assumptions. The import lies in the following realization: to the extent that the conditional assumptions are not set in stone but may be modified through human action (specifically by the action of the entrepreneur in our case), simple Bayesian estimation reveals which particular conditioning assumptions are to be manipulated by entrepreneurial action.

Bayes's formula has traditionally been used as an inference engine – a way of updating our beliefs in the face of states of the world actually realized. But it is capable of another use, namely, as a control engine – it can be used to manipulate states of the world (to the extent that the assumptions it is conditioned on are manipulable) to align with our beliefs. Thus what the conditioning assumptions are, how we choose them, and to what extent and in what ways we can manipulate them all become extremely relevant issues in the formulation of the problem from an effectual point of view.

To return to the concrete case of serial entrepreneurship, Bayesianism in an effectual world highlights the fact that probabilities in F-space need not be used merely to update probability assessments in E-space; instead they can be used to control event probabilities in E-space. In the trivial case, we can interpret this to mean starting more than one firm. But the real payoff lies in how the effectuator acts upon the event spaces with a view to reconstitute them.

Bayesianism in the case of the serial entrepreneur has two possible interpretations. In the first, the entrepreneur reasons as follows: I observe that the probability of firm failure is very high. Therefore I will start several firms. This is the normal way of interpreting Bayes's rule – as an inference engine. In the effectual interpretation, however, the entrepreneur reasons as follows: irrespective of what the probability of firm failure is, I can increase the probability of 'my' success through serial entrepreneurship. Although both interpretations result in serial entrepreneurship, the two encapsulate fundamentally different attitudes. And this difference leads to crucial differences in the way the decision-maker perceives, formulates and executes possible strategies that operationalize the decision.

If we only observed entrepreneurs' actions without looking deeper into whether they are using the normal Bayesian interpretation of any given probability estimate or an effectual logic, the data might very well appear consistent with the explanation that the entrepreneur suffers from an overconfidence bias. In fact, given the received wisdom about the failure rate for new firms, any entrepreneur who starts a firm will appear to suffer either from such bias or from a reckless love of risk. In a perverse way, this implies that the economy has to rely on individuals who make faulty decisions in order to achieve innovation, productivity and growth, or that policy makers have to induce people to start firms knowing that they are luring them to a quick demise. But an effectual interpretation suggests otherwise. By understanding the drivers of event spaces and categorizing them into those that are controllable through human action and those that are not, an effectual entrepreneur rejects the predictability of the future from past estimates. In other words, effectuators see themselves not as risk

takers defying long odds but as active agents capable of causal intervention in changing those odds.

A classroom experience provides a powerful example of this difference in interpretation. In my entrepreneurship course, I ask students to come up with an idea and actually start a new venture based on it. At the beginning of the course, most students are either nervous or clueless or both: they tell me they feel as if they are about to jump off a high board for the first time. But occasionally there are students who know exactly what they want to do and are able to articulate it very well right from the start. One such student, let us call him Joe, wanted to start an obesity clinic. His wife was an endocrinologist, he had been a personal trainer, and he had enough managerial experience to feel confident about making a go of it. When he first presented his idea in class, several students were worried about competing with such a well-formed idea while they themselves were struggling with seemingly trivial projects such as doggy day care, or simply unsure about what project to pursue.

Several weeks later, when students had to present their interim reports on their projects, Joe stood up and announced he was going to give up on the obesity clinic because his research had been clearly discouraging. He mentioned that the doctors he spoke to said that the probability of a patient losing weight and maintaining the weight loss was less than 20 per cent. He had also interviewed two founders of obesity clinics that had recently gone out of business. At the end of his presentation, three students raised their hands. They wanted to know if they could take up Joe's project! I asked them why they would want a project that clearly was a no-starter in Joe's book, particularly given the fact that he had seemed so well positioned to do better than they could.

These students had a variety of ideas about how they would make the project work and several interesting reasons why they thought that it was a great project to pursue.

- One argued as follows: if we can establish for a fact that only two out of ten patients make it, all we need to do is to make sure that at least three out of ten make it in *our* clinic. That would be a terrific competitive advantage.
- Another said: if only two out of ten make it, that means there is a real problem out there, a real need to be fulfilled. Maybe we need to develop and offer new services to this market, besides the usual counseling for diet and exercise. In other words, people will come to diet and exercise but will stay for other products and services that will make us profitable.
- And so on.

On the basis of my understanding of the research on cognitive biases, should I conclude that these students were overconfident? Should I discourage them from taking Joe's project and running with it? They were not ignoring the probability estimates or denying the facts. They were using the estimates to craft strategies that would either change the estimates themselves or change the estimates for their own success even if the estimates about the world remained unchanged.

According to the conventional interpretation of Bayesianism, all events are fully funded in their probabilities. In other words, they are analogous to the probability of rain – although knowing the probability allows us to take action (carry an umbrella, stay home, etc.) to prevent the consequences of the event (getting wet), the probability of the event itself is given, and cannot be changed. In the effectual interpretation of Bayesianism, however, not all events are fully funded. Instead, they are divided into three categories according to how controllable they are through human action:

1. Some events may be fully funded and beyond the decision-maker's control.
2. Others may be free or fully within the control of the decision-maker.
3. Still others may be as yet unfunded or controllable to some extent and under certain circumstances.

Obviously, in the case involving events of the first type, Bayesianism can be used only as an inference engine. In cases involving events of the second and third types, however, Bayesianism can not only be used to increase or reduce their probabilities but also to help identify specific strategies for doing so. In other words, in these two cases, the effectuator can reify or falsify specific conditioning assumptions by causally intervening in the world.

Expert entrepreneurs have at best a very uneasy relationship with predictive information in general and probabilities in particular. This uneasy relationship has been explained at various times as overconfidence bias – the tendency to ignore a high probability of failure (Busenitz and Barney, 1997), or as high risk propensity – the penchant for enjoying the low probability of success (Begley and Boyd, 1987). But the extant evidence on risk propensities, as I have mentioned earlier, is mixed, at best. To repeat the evidence, witness two recent meta-analytic studies, each of which found substantial evidence for and against risk aversion in entrepreneurs (Miner and Raju, 2004; Stewart and Roth, 2001). One reason for this, as I have shown elsewhere, could be the salience of the moderating effect of control irrespective of any innate propensity for risk taking.

But to put more meat on the effectual bone regarding how expert entrepreneurs process probability estimates, note the following sample quotes

from the expert entrepreneur protocols as well as from the interview data on founders of the RFID industry in Dew's research:

Traditional market research says you do very broad-based information gathering, possibly using mailings. I wouldn't do that. I would literally, target, as I said initially, key companies who I would call flagship, do a frontal lobotomy on them . . . [E26]

I've always tended to be very skeptical about market research studies. I always live by the motto of 'Ready-fire-aim.' I think if you spend too much time doing ready-aim-aim-aim-aim, you're never gonna see all the good things that would happen if you actually start doing it and then aim. [E14]

Never underestimate serendipity . . . And again I think that . . . in these types of situations, the traditionalists, which I call the M.B.A. from Harvard versus the entrepreneur . . . the M.B.A. from Harvard would confine themselves to certain paradigms that existed before. The entrepreneur would break the paradigm. They'll walk into a bank that they've never been in before and say, 'Hey, how about giving me a loan?' [E7]

You know . . . business or company is not like sports. In sports, all teams kind of come about equal strength and the outcome is uncertain and therefore, creates excitement. In business, you want to go . . . you put things together to succeed. It's not a sport. [E4]

As my friend and colleague Professor Sanjay Sarma is fond of saying, 'the "rules" about silicon that everybody knows were made at places like MIT, Berkeley and Stanford . . . And if we don't like the rules, we can change them.' In a conference speech, he crystallized his view that action could overcome entrenched beliefs: 'The solution is to build new roads: to change the rules. Making chips too expensive? Make it cheaper. Handling is impossible? Make it possible. Testing too costly? Find another way to test. These "rules" are not laws of physics or God. They are just technology boundaries – boundaries that until recently hadn't been explored because there was no call for smaller, cheaper, simpler silicon chips . . . (Kevin Ashton in Dew, 2003)

It worked because a user industry got together and made it happen. Nowadays 1.3 million companies worldwide use barcodes and they say there are 5 to 8 billion barcodes scanned a day in the supply chain alone – don't trust that number as I know where they got it from [i.e. me]. And we did it with users very involved because we needed to know that we were in the world of reality. Of course, a lot of people said we were crazy. There were no margins at the time in retailing for technology spending, so technology companies went elsewhere to do business. (Alan Haberman in Dew, 2003)

As exemplified in some of the quotes above, expert entrepreneurs prefer to eschew predictive information as much as possible and rely instead on direct action upon the world. In particular, they emphasize the positive side of unpredictability – the fact that surprises can be pleasant and contingencies can be unanticipated opportunities. In general, an expert entrepreneur rejects the wisdom of relying on probability estimates and

challenges several of the assumptions underlying predictive reasoning as follows:

1. I do not belong to the population of actors on the basis of whose actions the event space was calculated.
2. The event space is not independent of my actions.
3. Belief does not necessarily determine or even precede action.

The first of these is connected with how effectuators categorize themselves. When faced with a probability estimate such as the one in ten success rate for venture capital (VC) backed companies, expert entrepreneurs might argue the inapplicability of the estimate to their particular venture since they are bootstrapping their ventures and not using business-plan-based funding such as that offered by VCs. Or they may point to their ability to outlive failures and accumulate successes, thereby succeeding through quixotic persistence where others might quit after the failure of their first venture. Exemplars like Milton Hershey and Henry Heinz, who faced several bankruptcies before building enduring successes, are favorite sources of entrepreneurial identities. Such inspirations form the basis for the expert entrepreneur's argument that he or she is drawn from a different population, one that pulls the rug out from under probability estimates derived from 'random' samples that statisticians might favor. This last argument may have more substance than extant studies warrant us to believe. Especially since there are virtually no studies that estimate rates for entrepreneurs, extrapolating firm failure rates to entrepreneurs at present may be premature, misinformed and unjustified.

The above paucity of evidence is further exacerbated by the second argument against updating one's beliefs on the basis of probability estimates. When we examine the event space for calculating rates of successes and failures of firms, we need to contend with at least two sources of endogeneity with regard to entrepreneurial action. First, probability estimates even at the aggregate level can change over time, and they often do so because of human action. Witness, for example, the hazard rates for infant mortality due to smallpox. By working to eradicate the disease – that is, causally intervening in the event space – the probability has been changed. Effectuators implicitly or explicitly assume the potential efficacy of human action at all levels and in all domains to intervene in and transform event spaces. In other words, instead of using Bayesian reasoning as an inference engine to update their beliefs, they prefer to use it as a control engine to manipulate conditioning assumptions with a view to reifying or falsifying predictions based on them. Such intervention leads them to tap the second source of endogeneity: the fact that the 'market' as they conceive it often

consists of human actions and choices. Therefore, by directly influencing and working with others to control, create and reconstitute markets, these entrepreneurs seek to transform the event space so as to amplify the probability of success for their particular ventures. This logic leads them to entirely different decision criteria and manifestly different strategies than those that take the market as an exogenous given. Note the argument is not that outcomes are endogenous to entrepreneurial action but that the event space itself is.

Finally, the third challenge expert entrepreneurs pose is to the received wisdom that belief necessarily precedes action. A very large part of decision studies and almost all of normative decision theory assumes – explicitly or implicitly – that belief has to precede choice and action. Arguing for the priority of belief, this stream of thinking asks, ‘How do I act without knowing what to do? How do I get anywhere without learning where to go?’ The expert entrepreneur, like the poet Roethke, answers, ‘I learn by going where I have to go’ (Gensler, 1987).

A more careful and serious basis for the logic of action as opposed to the logic of belief preceding action is provided by philosophers such as Joas (1996). Entrepreneurship, like every other realm of human action, occurs in the ongoing theater of ordinary life. In the course of being born, growing through childhood to adulthood, and seeking to construct one’s identity, meaning and purpose in the world, some human beings become entrepreneurs. Entrepreneurship, then, is an instrument of making human meaning and solving human problems using economic means, rather than a reasoned choice that happens as a disconnected prior to all relevant entrepreneurial action. In such a world, where the causal priority of belief about particular outcomes is not a necessary condition for action, Starbucks can be the unanticipated side effect of a romantic adventure chasing the perfect cup of coffee, evocative of Captain Ahab’s pursuit of Moby Dick; and one man’s effort to manage a website without having to give up mountain-biking can lead to eBay.

Taken together, the three challenges explicated above to the use of probability estimates as engines of belief suggest an alternative logic that draws upon the creative potential of all human action, one that recognizes that both firms and markets are more like artifacts than forces of nature, economic and sociological terminology notwithstanding. In this world, meaningful action trumps premeditated choice on several important fronts. The expert entrepreneurs I studied are not unique in their challenge to the received wisdom that belief or reasoned choice has to precede action. There are several recent studies in developmental psychology (Bruner, 1990), philosophical sociology (Joas, 1996), cognitive linguistics (Lakoff and Johnson, 2000), and neuroscience (Schwartz and Begley, 2002) that suggest

that experiences in the world including movement in physical and social space are prior conditions that structure beliefs and preferences. In Chapter 13 I shall outline how some of these ideas may inform future research.

6.6 SUCCESS/FAILURE IS NOT A BOOLEAN VARIABLE

Expert entrepreneurs assume and live in an effectual universe – a world where belief does not have to precede action, where new goals are continually invented, and firm failure may well be an input into entrepreneurial success. In other words, when expert entrepreneurs state, ‘Failure is not an option’, they literally mean that success does not entail not-failing and failure does not imply non-success. This means that in an effectual universe, we cannot model success/failure as a 0–1 variable.

- As one of the subjects in expert protocol study stated about the long-successful multi-billion dollar venture he is currently running, ‘We fail all the time. The key is to know that success is a process and not an outcome. And failures are essential inputs into that process’.
- Or as E18 explained why he would continually raise money from any and all persons from day one, ‘I would raise enough money as if you would have . . . probably three or four upgrades on the product, so that, because you’re never gonna get it right the second time. I’d need really a third or fourth time at getting it right’.
- Or as Scott Cook, the founder of Intuit, put it in an interview with Harvard Business School:

A third part of creating an entrepreneurial culture is to celebrate failure. It’s very hard to be an entrepreneur inside a company if you feel you’re going to get crucified for failing, because there’s risk in being an entrepreneur. If you’ve tried ten things, five will fail. Besides, if you wait too long so that you can do enough research to be sure an idea will work, you’re probably going to be too late. So you’ve got to create an environment where people know it’s okay to fail and, that way, they’ll try a lot more. They’ll think outside the box. They’re willing to think differently because they know that if it doesn’t work, they won’t be scorched and they’ll still have a career.

At times, like when we’ve closed out a business, we’ve had something like a celebration of what we’ve learned. We celebrate what we now know that we did not know before because it will help us make much better decisions in the future. We celebrate those people who fail and everyone around them knows that they produced value. It wasn’t the value we intended, but it’s okay as long as we learn from it.

If we are to make sense of the statement, 'Failure is not an option' as something more than a banal bromide or as overconfidence bias, we need to find ways to analyse entrepreneurship itself as one of the instruments available to individuals and societies to achieve a plurality of purposes, some pre-selected and others emerging out of the very process of entrepreneuring.

NOTE

1. Personal conversation.

PART III

Waypoint

7. Entrepreneurship as a science of the artificial

Effectuation is a design logic for making things in a human-made universe. In other words, effectual entrepreneurship is a science of the artificial (Simon, 1981).

7.1 MAKER, MAKING, MADE

Mrs Tarleton: You always were one for ideas, John.

Tarleton: You're right, Chickabiddy. What do I tell Johnny when he brags about Tarleton's Underwear? It's not the underwear. The underwear be hanged! Anybody can make underwear. Anybody can sell underwear. Tarleton's Ideas: that's what's done it. I've often thought of putting that up over the shop.

George Bernard Shaw, in *Misalliance* (1909)

Shaw's John Tarleton is a self-made millionaire and founder of Tarleton's Underwear. He believes in all things new. He built his business out of new products, new technologies and new efficiencies and is always on the lookout for new things. He uses his surplus millions to endow free libraries and is continually energized by people and ideas that seek to create a new order and new worlds, and perhaps even a new species, the next step in our evolutionary destiny – an enterprise close to Shaw's heart.

Tarleton sees himself as a creative thinker, a man of ideas, who just happens to make and sell underwear. The world's specifications for the underwear are so specific that they practically define the shape of the solution; what scope then for creativity, design, and changing the world? As an entrepreneur, artist and friend of philosophers and scientists, Shaw was acutely aware of Tarleton's dilemma (Nethercot, 1954). His play, *Misalliance*, may be read as an attempt to refute a very plausible thesis, namely, that actions are distinct from ideas, that entrepreneurial creativity is not really artistic creativity, and, finally, that artifacts can be designed without perturbing the world.

It is a separation thesis. The schisms it promotes are connected with a variety of other separation theses – the body as separate from the mind (Descartes, 1999); science as separate from ethics (Dewey, 1930); business

as separate from society (Freeman, 1994);¹ texts as separate from lumps (Rorty, 1991); and so on. In particular, it has deeply influenced the study and teaching of entrepreneurship.

For example, because actions are held to be distinct from ideas, much of decision theory focuses on correct causal reasoning. Entrepreneurs become Solomons dividing Opportunity's baby between Risk and Return. In this view, something like bounded rationality becomes equivalent to constrained optimization, rather than a different kind of rationality altogether.

Similarly, because entrepreneurial creativity is believed to be different from artistic creativity, Andrew Carnegie's expertise may not be studied the way, say, Picasso's or Kasparov's is. As a result, the entrepreneur becomes either a heroic figure, a container of to-be-identified traits, or a non-entity, abstracted out as firms spontaneously arise to meet the demands of an exogenous environment. Both consequences are untenable. While it takes a certain Panglossian complacency to say that if Picasso had not existed he would have been invented, such substitutability and inevitability arguments are quite common in discussions about the role of entrepreneurs in the economy.

Finally, because artifacts are seen as separable from the world, it is tempting to regard the world as an inexorable boundary condition. Just as demand curves are given, or markets are given, or firms are given, the world too becomes a *given*. It is even more tempting to model the given as constant. Most tempting of all is to regard the given as not only fixed but also fundamentally outside of one's control. The first temptation leads to unimaginative products (McCloskey, 1990), the second to undifferentiated ones (Hackner, 1996), and the third to products that are reactive rather than responsive and responsible (Wicks, 1996).

If the fictional John Tarleton embodies the difficulties inherent in the separation thesis, the 18th-century English entrepreneur Josiah Wedgwood (1730–95) embodies the resolutions afforded by its denial. He was the 13th son of a poor English potter who survived smallpox and an amputation to become the Queen's potter, a member of the Royal Society, friend of philosophers and scientists, and founder of a company and a brand that still exists and prospers. A relentless capitalist, he built a fortune that would eventually finance the voyage of his grandson Charles Darwin. That is the heroic version of Wedgwood's story, its aspects made even more satisfying by their general verity.

Was Wedgwood merely an extraordinary man in an extraordinary time? A more detailed look at his life reveals a man who embodied the notion of the 'self-made man' – a self-made man, moreover, who actively remade the world around him. His artifacts embodied his ideas, but the very process of making the artifacts remade his ideas and his identity. While Wedgwood was recovering from a life-threatening amputation in Liverpool, his doctor

Mathew Turner introduced him to Thomas Bentley, gentleman–philosopher and founder of the Nonconformist Society. In what has been called ‘the most important partnership of the eighteenth century’ (Koehn, 1997), Wedgwood and Bentley set out to *embody* in their wares the progressive ideas of their day. Wedgwood even struck a seal of the Slave Emancipation Society in 1786 to help William Wilberforce in his campaign for the abolition of slavery. Wedgwood and Bentley consciously strove to make pottery synonymous with social mobility – the notion that one need not live in the class into which one is born. Wedgwood’s pots were no more pots than the Statue of Liberty is a pile of green metal.

Making pots that embodied human aspirations also made the potter more than just a potter. Wedgwood was actively involved in a variety of initiatives not usually associated with potters, such as the Lunar Society of Birmingham (which included luminaries such as Matthew Boulton, James Watt, William Herschel, Joseph Priestley and Erasmus Darwin). He invented the pyrometer (which won him election to the Royal Society) and variable cost accounting. His pre-Adam Smith implementation of the division of labor, and his pioneering adoption of technical innovations (his firm was the first to install Watt’s new engine), exemplify an individual in whom scientific, entrepreneurial and social innovation merged in a seamless whole.

Finally, the details also reveal a man who did not take the world as given, who did not accept a society or an epoch as a set of constraints on his actions. Faced with poor roads and high freight costs for his delicate chinaware, Wedgwood collaborated with the Duke of Bridgwater, James Brindley and others to arrange the financing for the 93-mile long Trent–Mersey Canal. Building a canal was for Wedgwood as much a part of his enterprise as making plates. It not only gave him access to the ports at Liverpool and Hull, but also reduced his freight costs by 90 per cent. Similarly, when faced with a shortage of skilled artists to work on his ornamental wares, Wedgwood wrote to Bentley, in 1773, that they must make artists of ‘mere men’ since ‘few hands can be got to paint flowers in the style we want them. I may add, nor any other work. *We must make them.* There is no other way’ (Koehn, 1997).

Like Wedgwood, effectual entrepreneurs perceive the world around them as *human-made* – artifactual; they know their actions *constitute* their ideas, just as their ideas are *embodied* in their artifacts. These propositions are not so much beliefs or desires but elements of an effectual logic. To put an effectual logic to work in the world, we need to rethink our preconceived separation theses about ideas and action, thinkers and doers, body and mind. Tarleton must take his place in a three-dimensional world where the maker of underwear *is* the man of ideas. An effectual lens allows Tarleton to begin seeing in stereoscopic vision.

7.2 EFFECTUAL ENTREPRENEURSHIP AS A SCIENCE OF THE ARTIFICIAL

In *The Sciences of the Artificial*, Simon did not explicitly discuss entrepreneurship as an instance of such a science. But it is implied in his classification of the *social* sciences under the rubric of the *artificial*. For Simon, human intention and design were central to the social sciences, and the word ‘man-made’ was synonymous with ‘artificial’:

The world we live in today is much more a man-made, or artificial, world than it is a natural world. Almost every element in our environment shows evidence of man’s artifice. The temperature in which we spend most of our hours is kept artificially at 20 degrees Celsius; the humidity is added to or taken from the air we breathe; and the impurities we inhale are largely produced (and filtered) by man. (Simon, 1981: 4–5)

And a little later:

One may object that I exaggerate the artificiality of our world. Man must obey the law of gravity as surely as does a stone, and as a living organism man must depend for food, and in many other ways, on the world of biological phenomena. I shall plead guilty to overstatement, while protesting that the exaggeration is slight. (Ibid.: 5)

7.2.1 What is a Science of the Artificial?

Simon included in the sciences of the artificial the study of those ‘objects and phenomena in which human purpose as well as natural law are embodied’ (Simon, 1981: 6). He provided several characterizations of what he meant by an artifact. The following excerpt is useful (ibid.: 8):

1. Artificial things are synthesized (though not always or usually with full forethought) by man.
2. Artificial things may imitate appearances in natural things while lacking, in one or many respects, the reality of the latter.
3. Artificial things can be characterized in terms of functions, goals and adaptation.
4. Artificial things are often discussed, particularly when they are being designed, in terms of imperatives as well as descriptives.

In short, artifacts are fabrications.² They exhibit behavior, and they are often described, rightly or wrongly, in intentional terms.

For example, the firm can be thought of as the synthesis of formal and informal contracts; in the eyes of the law, it is a person with rights and

responsibilities; it can be characterized as a profit maximizer or a producer of such-and-such a good; and finally, things like a firm's 'mission statement' and 'business plan' can be interpreted as attempts to describe the firm's imperatives and descriptives, respectively.

Simon also defined an artifact as a boundary (interface) between an inner environment and an outer one:

An artifact can be thought of as a meeting point – an 'interface' in today's terms, between an 'inner' environment and an 'outer' environment, the surroundings in which it operates . . . Notice that this way of viewing artifacts applies equally well to many things that are not man-made – to all things in fact that can be regarded as adapted to some situation; and in particular it applies to the living systems that have evolved through the forces of organic evolution. (Simon, 1981: 9)

A science of the artificial – an *artifactual science* – studies some subset of human artifacts (henceforth, artifacts). Thus sociology studies societies, folklore studies oral traditions, psychology studies human behavior, economics studies the production and consumption of goods, and so on.

There are two key elements in Simon's conception of an artifactual science. The first is that the interest is in *human* artifacts. It is for this reason that a field such as myrmecology (the study of ants) is not an artifactual science, even though ants build artifacts, namely, ant heaps. The second element has to do with the relationship between artifacts and natural laws. Simon repeatedly emphasized that natural laws constrain, but *do not dictate*, the fabrication of artifacts. That is, it is possible to *design* artifacts.

The social sciences often cope with the wild complexity of human behavior by denying the importance of these elements. Such coping mechanisms take a variety of forms. Some theories distance themselves from the annoying human element. For example, behaviorism, in its fundamentalist incarnations, denies the relevance of human purpose in understanding human behavior. Similarly, 'pure sociology' dreams of a theory characterized by the 'presence of several absences: ideology, teleology, psychology, and people . . .' (Black, 2000: 705–6). Other theories undervalue the constraints imposed by natural laws. For example, standard rationality models in neo-classical economics ignore the limitations biology imposes on human cognition. Then there are theories that attempt to reduce *all* aspects of human action to natural laws. For example, sociobiology (Wilson, 1980), structuralism in sociology (Mayhew, 1980), and automaticity (Kirsch and Lynn, 1999; Wegner, 2003) in psychology come to mind. It is not uncommon to justify the lack of realism by *as-if* arguments.³

Consequently, every social science lives under the threat of potential subsumption by some other more 'physical' sciences. Thus, anthropology in the

Durkeim/Geertz tradition is under attack from evolutionary psychology (Tooby and Cosmides, 1992), psychology awaits subsumption by neuroscience (Horgan, 1999; LeDoux, 1998), political science is threatened with models from economics (Friedman, 1996) and neoclassical economics faces the onslaught of ‘econophysics’ (Mantegna and Stanley, 2000).

In a prescient comment, Simon suggests that the problem with building a science of the artificial has a deeper cause:

The previous chapters have shown that a science of artificial phenomena is always in imminent danger of dissolving and vanishing. The peculiar properties of the artifact lie on the thin interface between the natural laws within it and the natural laws without. What can we say about it? What is there to study besides the boundary sciences – those that govern the means and the task environment? (Simon, 1996: 113)

The question is a rhetorical one. Simon’s answer is that:

The proper study of those who are concerned with the artificial is the way in which that adaptation of means to environments is brought about – and central to that is the process of design itself. (Ibid.: 113)

Simon’s shift in emphasis from the complexities of human behavior to design is a shift from *as-if* models to *even-if* models. (More on this in Chapter 9.) Thus, *even if* human behavior is complex, the design principles behind artifacts may well be simple. The point is that, unlike the social sciences which tend to focus on the *analysis* of dependencies, the artifactual sciences are more interested in the *design* and *control* of dependencies. This focus on design shapes the kind of questions that are of interest in the artifactual sciences. In particular, it reshapes the questions that are of interest to entrepreneurship.

7.2.2 How Can We Study Entrepreneurship as an Artifactual Science?

The artifacts of interest to entrepreneurship are the entrepreneur and the firm. The entrepreneur represents the boundary between an inner environment (mental) and an outer environment (the rest of the world). In the case of the firm, its employees and owners constitute the inner environment. To study entrepreneurship as an artifactual science is to ask design-oriented questions, to focus on the how of things rather than the why, and look for *even-if* rather than *as-if* arguments.

As Simon predicted, there is the constant temptation to focus on the boundary sciences. In entrepreneurship, an emphasis on inner environments leads to a preoccupation with issues such as the traits of the individual

(psychology), or the resource bases of the firm (microeconomics). An emphasis on outer environments leads to a preoccupation with issues such as the life cycle of the industry (evolutionary economics) or the institutional context of its technologies (sociology, macroeconomics). Furthermore, we try to relate these sciences directly to outcome measures such as survival, growth and profits. The trouble with such shifts is that the questions we ask are no longer the questions we care about (Sarasvathy, 2004).

For example, a theory of accounting does not worry about why people become accountants. Nor does the theory of database design care why some people choose to spend their time designing databases. So why does a theory of entrepreneurship worry about why some people become entrepreneurs? The reframed question is perhaps more tractable. What are the barriers to entrepreneurship? For example, an immature system of property rights and titled assets (De Soto, 2000), governments that are not market augmenting (Olson, 2000), and low variety in sources of risk capital (Sarasvathy, 2000: Comments by Venkataraman) are all barriers that prevent people from becoming entrepreneurs. Finding ways to eliminate these barriers would be an important part of studying entrepreneurship as an artifactual science. Low levels of unemployment (Blanchflower and Oswald, 1998) also deter people from becoming entrepreneurs, suggesting interesting research questions as to markets for entrepreneurship in an economy.

Designing artifacts almost always involves making their inner and outer environments resemble each other in useful ways. The humble spade is a good example: its inner environment (wood and metal) is shaped to fit its outer environments – namely, the human hand at one end and the earth at the other. Thus entrepreneurs not only design firms as instruments that adapt to their environments (and help exploit profit opportunities within those environments); they also shape parts of their outer environments to resemble more closely both their personal aspirations and their firms' resource endowments (and so create new wealth and value opportunities for their stakeholders).

For example, as was mentioned in earlier chapters, there are several studies that try to pin down the risk propensity of entrepreneurs as opposed to control groups of non-entrepreneurs. A design perspective would reframe the question: how do entrepreneurs with certain levels of risk propensity design their ventures differently than those with other levels? Or, *given* that some people are risk-loving (or risk-averse), can we tell them something useful about types of financing they would or should go for? In other words, instead of trying to explicate the relationship between the psychology of the individual entrepreneur (say, self-efficacy or risk propensity) with performance (say, firm survival or return on investment), we could try

to understand how entrepreneurs with certain levels of self-efficacy, or personal values and aspirations, fashion particular strategies in particular industries, or create firms with particular exit strategies, and so on.

Similarly, instead of directly assessing the effect of industry environment on firm performance, we could study how entrepreneurs, given that they have survived in particular environments (say, high-velocity environments), design decision procedures that cope with those environments (Eisenhardt, 1989).

The examples could be multiplied. But I hope the point is clear. To study entrepreneurship as an artifactual science, we need to focus on how individuals and firms design their inner and outer environments, especially how new goals, adaptive and negotiated, come to be; how particular strategies shape environments, reformulate individual preferences and reorganize firm structures. Studying entrepreneurship as an artifactual science requires us to recognize that design often involves the shaping of inner as well as outer environments; one cannot be held fixed to convenience the other.

Simon identified several design principles. Two of them are particularly relevant to understanding the nature of artifacts built through an effectual logic: the principle of non-predictive control and the principle of near-decomposability (Simon, 1981; Simon and Ando, 1961).

The principle of non-predictive control has already been discussed at some length in Chapters 4 and 5. Non-predictive control is an *even-if* principle; it claims that even if the future is uncertain, unknowable and unpredictable, it is still possible to design the artifacts we desire. Simon recognized its importance in the design of artifacts:

Since the consequences of design lie in the future, it would seem that forecasting is an unavoidable part of every design process. If that is true, it is cause for pessimism about design, for the record in forecasting even such 'simple' variables as population is dismal. If there is any way to design without forecasts, we should seize on it. (Simon, 1996: 147)

The principle of near-decomposability describes the structural aspects of artifacts that are required to satisfy certain stability properties. Effectual entrepreneurship, I shall argue, builds stakeholder networks that implement this principle. Note that the principle is ubiquitous, useful, simple (but non-trivial), often confused with modularity and a relatively neglected idea in entrepreneurship; these ideas motivate the next section.

7.2.3 Near-decomposability: a Key Principle in the Design of Enduring Artifacts

Near-decomposability (ND) was originally formulated as a property of dynamic systems.⁴ In a seminal paper, Simon and Ando (1961) considered

a class of dynamical systems in which (a) the short-term behavior of each subsystem is *approximately* independent of the other subsystems at its level, and (b) the long-term behavior of each subsystem depends on the other components only in an (*approximately*) aggregate way.

Dynamical systems defined by linear, first-order, differential equations with coefficient matrices that are ε -equivalent to block-diagonal coefficient matrices provide a standard example of ND systems. By ε -equivalent, I am referring to the operation of setting to zero any matrix element smaller (in absolute value) than a fixed positive real number ε . For example, the matrix on the left is ε -equivalent to the matrix on the right if ε is chosen to be 0.01.

$$\begin{pmatrix} 1.0 & 0.2 & 0.0 & 0.001 \\ 0.2 & 3.0 & 0.8 & -0.005 \\ 0.0 & 0.8 & -2.0 & 0.8 \\ 0.001 & -0.005 & 0.8 & -1.0 \end{pmatrix} \rightarrow \begin{pmatrix} 1.0 & 0.2 & 0.0 & 0.0 \\ 0.2 & 3.0 & 0.8 & 0.0 \\ 0.0 & 0.8 & -2.0 & 0.8 \\ 0.0 & 0.0 & 0.8 & -1.0 \end{pmatrix}$$

If such matrices represent the ‘interactions’ between subsystems, then ε -equivalence says that the interactions between them are (approximately) restricted to local, non-overlapping groups of subsystems. It is this restricted interaction that enabled Ando and Simon to extend the dynamics of totally decomposable systems to near-decomposable ones.

Unfortunately, ‘near’ is a very fuzzy word. In one sense, it means ‘almost’. A ‘near miss’ is a miss; ‘nearly successful’ is not a failure; ‘nearly home’ means almost home; and ‘nearly dead’ implies someone is close to the end. Thus ‘near-decomposable’ could mean ‘almost decomposable’. In particular, it would also support the idea that near-decomposability is equivalent to modularity.

Studies of modularity have generally modeled ND as something in the middle of a continuum with complete decomposability at one end and complete unitary identity at the other. Witness, for example, Melissa Schilling’s characterization:

Modularity is a general systems concept; it is a continuum describing the degree to which a system’s components can be separated and recombined, and it refers both to the tightness of coupling between components and the degree to which the ‘rules’ of the system architecture enable (or prohibit) the mixing and matching of components. Since all systems are characterized by some degree of coupling (whether loose or tight) between components, and very few systems have components that are completely inseparable and cannot be recombined, almost all systems are, to some degree, modular. (Schilling, 2000: 312–34)

Others use more general definitions, such as ‘a system’s performance is dependent not only on the performance of constituent components but

also on the extent to which they are compatible with one another' (Garud et al., 2002: 198). It seems reasonable, therefore, to interpret 'modularity' as intrinsically including the idea of 'near-modularity'; given this interpretation, I will simply say 'modularity' rather than 'near-modularity'.

ND is not modularity, notwithstanding the latter's importance, ubiquity and usefulness. There are two significant differences between the two ideas, differences that may be classified under structure and function, respectively.

ND versus modularity: structural differences

It is natural to think of ND systems as something in between totally decomposable systems and totally connected ones. The fact that Simon liked to exemplify ND in terms of matrices (Simon, 1973; Simon and Ando, 1961) would seem to support this interpretation; diagonal matrices represent the class of totally decomposable systems, low-bandwidth matrices are identified with ND systems, and dense/high-bandwidth matrices represent the class of totally connected systems.⁵

This could be called the *gradualist view*; it says that ND is a matter of degree, and that the degree may even be measurable on a suitable ratio scale. The gradualist view asserts that the difference in the behavioral regimes of two systems at different points of the scale is a smooth function of the degree of ND. In this interpretation, lumpability (Kemeny and Snell, 1960), ND and modularity are roughly interchangeable ideas.

But two-dimensional matrices can be deceptive. For example, the existence of the different phases of matter is not obvious from the interaction matrices of solids, liquids and gases. The interaction matrices of gases are indeed less sparse than those of liquids, which in turn are less sparse than those of solids. The *strength* of those interconnections, however, is another matter altogether. A small perturbation in the composition of the interaction matrices can lead to phase shifts that completely transform material properties.⁶

The point is that the concept of ND survives this example (of phases of matter), but that of modeling ND by interconnection matrices really does not. I think Simon's use of matrices to exemplify ND has obscured an essential aspect of ND. Systems (like the phases of an element) are either totally decomposable, or nearly decomposable, or totally non-decomposable. Each state can be characterized by interaction matrices, but it is important to keep in mind that there are two factors at play: incidence (who is connected to whom) and relative intensity (how strong the connection is in relation to other connections). Incidence is important, but as the many examples from catastrophe theory and the theory of dissipative systems show, small shifts in the relative intensities of system interactions can result in sudden shifts to new behavioral regimes.

The idea that maximally decomposable systems, ND systems and maximally connected systems are like the phases of a material, characterized by entirely different behavioral regimes, and that systems can phase-transition from one regime to another, might be called the *saltationist view* of ND. It says that ND is a difference in kind, and not degree, from the two limiting cases.

Was Simon a gradualist or saltationist? The example in Simon and Ando (1961) considered the phenomenon of heat diffusing through a set of insulated rooms. As the word ‘diffusion’ suggests, things happen gradually. But I think this is a case of the example wagging the theory dog. The example tries to illustrate two ideas: the *unique* behavioral aspects of ND as well as its connection to the two limiting cases. Unfortunately, the example’s setting makes it difficult to see why ND is not just an exercise in lumped matrix theory.

On the other hand, there is evidence that Simon viewed ND systems as dynamically distinctive. After presenting the familiar heat diffusion example, he asserts that, ‘as the example shows, ND systems have very special dynamic behavior’ (Simon, 2002: 590). It is a difficult belief for a gradualist to maintain, for there would then be no critical point at which the system suddenly ‘became’ ND and thereby ‘special’. Furthermore, his oft-repeated statements on ND as the key aspect of organizational hierarchies are consistent with the saltationist interpretation. From an organizational perspective, the ND hierarchy is as different from the interconnected-network model and the independent-agent model as a liquid is from a solid or a gas.

In short, an unfortunate example (heat diffusion) and an over-reliance on a matrix representation of ND has led to a gradualist interpretation in which ND is on a continuum between two limiting cases (namely, total dependence and total independence). But if ND is not a matter of degree, what is it? How does an ND system *look* as compared with a modular system? How does it come to be?

To answer this question, consider what is required for a modular system to work. If the full advantages of modularity are to be realized, the interactions between the modules also need to be separable. It is no use designing the parts of the system to be modular if, in terms of interactions, every module may be interacting with every other module. For example, the architect, Christopher Alexander, demonstrates convincingly that city planners who ignore this fact end up with cities that are snarled, congested messes (Alexander, 1988).

Conversely, if the interactions are separable, then *de facto* modules emerge naturally. For example, Thomas Schelling’s celebrated segregation model showed that a small bias for like-colored neighbors could lead to

total segregation (Schelling, 1971). Similar phenomena have long been studied in morphogenesis (Mostow, 1975).

Such *de facto* modular systems endure because they embody people's actual preferences rather than estimated or predicted preferences. The inner and outer environments match, so to speak. Because enduring systems that evolve out of interactions often *look* modular, it is tempting to invert the implication and claim endurance as a characteristic of modularity.

I suggest that ND systems be identified with those modular systems that emerge out of such local and contingent interactions between elements. At any point in time, there exists a system in some state of differentiation and specialization. At each point in time, it proceeds further to differentiate and specialize but maintains its identity throughout the process. I will side-step the question of identity for the moment and focus on the step of differentiation and specialization.

Differentiation is achieved by interactions that reflect a commitment to some criteria. For example, in Schelling's segregation model, the commitment is reflected in a slight bias for people of one's own color. Once differentiation is effected, the parts specialize as a consequence of their isolation. This process continues until the original system is a patchwork of specialized and differentiated 'quilts'. Keep in mind, however, that the system as a whole has an identity that differentiates it from other such systems, and marks its future growth. History matters in the development of ND systems, but only in so far as it persists in the notion of identity (Alexander, 1959, 2000). In the next section I shall examine the role of identity in both ND and modular systems.

ND versus modularity: functional differences

There is another sense in which the word 'near' is used as a qualifier. 'Near' is also used to mean 'not quite'. A 'near accident' is not an accident; 'nearly happy' is still unhappy; and the law takes the optimistic view on 'nearly dead'. As I pointed out in the last section, sometimes things can be very close in terms of degree and yet be very different. For example, the mathematician Ramanujan noticed that:

$$22\pi^4 = 21.43 + 2.748 \dots \times 10^{-6}$$

$22\pi^4$ is very close to being an integer. But of course, it is not an integer; were it an integer, π would be a fraction, and it would be possible to square the circle. In 1994, Intel assumed that a chance of 1 in 9 billion of a certain floating point division error in the Pentium 2 chip was practically the same thing as zero. Not quite – Intel's assumption led to a \$455 million recall. In this use of the word, nearly something is not something.

So, when we say a system is ‘nearly’ decomposable, it is reasonable to ask what prevents it from being fully decomposable. From the previous section, we know that the answer cannot – should not – rely on an argument based on degrees. Ramanujan’s number, $22\pi^4$, is only a hair’s breadth away from being an integer, but it might as well be on the moon. Being real is not a matter of degree, so to speak. If we wish to claim that calling an ND system fully decomposable is a category mistake (the assignment of an object to the wrong category) and not an approximation error, then we need to look for deeper causes.

Gilbert Ryle, in discussing category mistakes, gave the now famous example of the university:

A foreigner visiting Oxford or Cambridge for the first time is shown a number of colleges, libraries, playing fields, museums, scientific departments and administrative offices. He then asks ‘But where is the University? I have seen where the members of the College live, where the Registrar works, where the scientists experiment and the rest. But I have not yet seen the University in which reside and work the members of your University.’ It had then to be explained to him that the University is not another collateral institution, some ulterior counterpart to the colleges, laboratories and offices which he has seen. The university is just the way in which all that he has already seen is organized. (Ryle, 1949: 334)

A university is a collection of buildings, to be sure, but a collection of buildings does not add up to a university. The visitor made not just a category mistake but also a reification error – treating an abstract object as if it were a concrete one.

Similarly, take the case of a franchise – say, McDonalds. While the parent organization is decomposable into franchises – each of which can be customized to local environments and closed without major repercussions to the organization as a whole – McDonalds is not a collection of mom-and-pop hamburger joints. That is because the *identity* of McDonalds matters to the health of both the individual franchises as well as the whole organization. Besides obvious gains of scale and substantial purchasing clout with suppliers, there is an ineffable McDonalds *experience* that constitutes an important part of every individual franchise’s demand function.

In contrast, in most discussions of modular systems, the important attributes are, as the dictionary suggests, ‘flexibility’ and ‘variety in use’, not identity. Consider, for example, the following discussion on modularity under changing conditions, in Langlois (2002):

Innovation that takes place through change in the modules we can call *modular* innovation (Langlois and Robertson, 1992, pp. 301–302; Sanchez and Mahoney, 1996, pp. 68–69). This is in contrast to what Henderson and Clark (1990) call *architectural* innovation, in which the parts remain the same but the

architecture connecting them changes. Notice, however, that architectural innovation need not always imply a change in the system's visible design rules: Legos and Tinkertoys are classic modular systems designed for architectural innovation. Here, the architecture – the way the unchanging parts are recombined – can change without a fundamental change in the overall modularization. And, in fact, personal computers also benefit from the mix-and-match capabilities of a modular system that allow one to configure the system to taste as much as they do from improvement in the constituent modules. (Langlois and Robertson, 1992: 25)

Thus the use of 'near' in nearly modular is a negative concept, corresponding to things not being quite plug and play; perhaps a piece has interfaces different from the others, or perhaps it can be used only in a few contexts, or perhaps a context demands a specific piece and no other. It is not, as the above quote indicates, that modular systems cannot endure or change as conditions change. The key difference is that in modular systems, nothing is expected to be so vital as to be required to persist over time. Modular endurance, here, is in the sense of George Washington's axe or Hobbes's Ship of Theseus; it is not what is evoked, say, when one pours tea from a Wedgwood pot.

A chair designed in a top-down modular manner has an identity; it is, after all, a chair and not a table. But its pieces could very well be used to build a desk, a shelf, or an abstract sculpture. In contrast, identity in ND systems is not a side effect, an unintended consequence of the final form; instead, at every step it informs the form of the emerging structure. The thing *is* because it has identity: it does not have an identity because it *is*.

The notion of a unified organizational identity has important implications for designers of ND systems. An understanding of identity tells us where the 'lines of tearing' (to use a term Simon borrowed from the work of the brilliant engineer and eccentric, Gabriel Kron) should be. Every ND system could conceivably have multiple lines of tearing; that is, it could be decomposed in *multiple* ways into different pieces which could then be recomposed into the whole.

Identity can be studied as an empirical concept. It involves pinning down what is common across many different parts, or what the whole has always been about, or what endures across change. It may be studied in terms of what people think they are buying or what cannot be duplicated by a competitor. Empirical sturdiness of this kind may be seen in the fact, for example, that Starbucks is *not* a franchise, as we saw in Chapter 4. For the Starbucks identity, as contrasted with McDonalds, the role of the 'Barista' is extremely central. Therefore the company believes it would lose its particular quality of experience if it adopted a franchise system.

It is worth summarizing the argument so far:

1. A science of the artificial studies human artifacts. An artifact is a boundary between an inner and outer environment. Artifactual sciences generally rely on *even-if* explanations rather than *as-if* ones.
2. The principle of non-predictive control and the principle of ND systems are useful in the design of artifacts.
3. ND systems are different from modular systems in that they are designed from the bottom up through iterative, committed interactions that differentiate and specialize. A sense of identity is not an effect but a driver of this process.

The next section has as its subject the final piece of the argument, namely, the claim that the effectual process creates artifacts that are nearly decomposable.

7.2.4 ND and Effectuation

Simon suggested that there might be a connection between effectuation and ND (Sarasvathy and Simon, 2000). His rationale was as follows: as ND is an astonishingly ubiquitous principle in the architecture of rapidly evolving complex systems, and effectuation appears to be a preferred decision model with entrepreneurs who have created high-growth firms, we should be able to link ND to the processes these entrepreneurs use to create and grow enduring firms – whether in an experimental situation or in the real world.

Delving into both theories with this new insight led me to realize that the connection lay in the roles that locality and contingency play in each. Locality here refers to the fact that cognitive limitations on our rationality allow us to build artifacts that achieve only local optima at best; yet our artifacts can endure over time by learning to adapt to contingencies and sometimes even exploit them.

In designing artifacts, human beings are confined within rather narrow local limits in terms of space, time and knowledge – primarily because of the bounds on our cognitive capacities and the natural limits on our internal information-processing system.

1. We can attend only to a limited number of things at a time.
2. Our planning horizons tend to be for the short term rather than the long term.
3. The stock of knowledge at any given point in time exists dispersed across individual experts and specialized knowledge corridors that are not always easily accessible to all decision-makers.

Designs inherit the limitations of their designers. Most artifacts are only locally adaptive; they flourish only within particular domains and short-run periods. If artifacts are to endure, they need to have a way to deal with changes in local environments over time, whether these are changes in technologies, preferences, or other contingencies that reshape the environment. ND systems are very good at exploiting both locality (necessitated by the limitations of the inner environment) and contingency (necessitated by the changing complexities of the outer environment).

That brings us to the question of how effectual processes can create ND artifacts. Here the analogy of a patchwork quilt is again very useful. Using effectual processes to create firms and markets is somewhat like making a patchwork quilt. Quilters begin the process with a random assortment of fabric patches and seek to create a meaningful and pleasing pattern in the quilt they make with them. In the beginning, the quilter could try different combinations of patches that suggest possible patterns and pictures in the finished quilt. Although the availability of the particular assortment of patches constrains the design, it does not determine it. A good quilter can create intriguing and even meaningful patterns with the most chaotic of initial assortments. Furthermore, as the quilt begins to take shape, quilters might seek out particular patches outside their initial endowments, say from friends and garage sales. Contingent upon the patches they find, they might change their initial designs as new possibilities emerge and they develop better visions for the finished quilt.

It turns out, therefore, that such effectually created patchwork quilts can be rather good examples of ND systems. Particular patches have to work with other patches to create an interesting pattern, but sections can be reworked without redoing the entire quilt. A causal analogy to this effectual quilt would be a jigsaw puzzle, where the picture already exists and the pieces are merely to be assembled ‘correctly’. The patchwork quilt, however, has no predetermined pattern and depends almost entirely on the quilter’s imagination and wit.

In general, whereas causal models are tethered to goals, effectuation is unmoored from specific goals. This enables the effectuator not only to change particular goals but also to create multiple new ends that could not have been foreseen at the beginning of the process.

As we saw in Chapter 5, the effectual entrepreneur begins with who she is, what she knows and whom she knows, to discover at least one customer or partner who is interested in a product or service she can offer. Thus the first stable configuration of product/stakeholder/environment comes into existence (perhaps after several aborted starts). But the first stable configuration changes the means now available to the entrepreneur and the stakeholders in her new venture – its knowledge corridors expand, its social

networks grow larger and even its identity is enhanced, through, for example, reputation and legitimatizing effects. Depending on the first stakeholders and their interests, the effectuator starts expanding the initial configuration, continually adding new configurations in a contingent (and usually stakeholder-dependent) fashion. Throughout this iterative process, she and her stakeholders tie the different pieces together through innovative yet meaningful themes that become embodied in mission statements, business plans, marketing brochures and press kits. While the bottom-up building-block-by-building-block process reduces the costs of failure, the continual effort to create a unified identity allows the effectual venture to accumulate successes, learn what works and what doesn't, and forge competitive competencies.

In this way, effectuation creates ND artifacts. Firms cannot be completely decomposable or 100 per cent modular, if they are to have a strong identity that inspires loyalty and trust with internal stakeholders. Yet they need to be ND so that negative feedback from external stakeholders can be incorporated to rework parts of the firm as it grows and endures in the marketplace. It is this particular opportunity to perceive and harness advantages both from the interdependence of parts and their independence that gives effectually created ND entities a peculiar edge in evolving faster and enduring longer.

To illustrate these ideas, let us consider an extract from one of the protocols in the expert entrepreneur study, fully reproduced in Appendix 2. The subject was asked about the growth possibilities for the new firm he was asked to build for the imaginary simulation game of entrepreneurship called *Venturing* (see Appendix 1 for the research instrument).

I use the extract, not as evidence for the inevitability of ND in the structure of effectual artifacts, but merely as an illustration of how effectual processes *could* build ND into economic artifacts. Notice how he begins by showing little faith in the product, but eventually he manages to imagine himself into the vision of a great company (relevant phrases have been marked in bold). Notice also that at least three times during the protocol he strives to tie together the different bits and pieces he is imagining through a common theme or an 'identity' of sorts (such phrases have been italicized).

To summarize the exposition so far, both effectuation and ND exploit locality and contingency in the evolution of the artifact. Just as effectuation creates rapidly evolving artifacts that leverage the *interdependence* of parts to exploit locality and contingency, so ND in the structure of such systems leverages the *independence* of parts to exploit the same locality and contingency. While effectuation stitches together pieces of entrepreneurial fabric into economic quilts that continue to make sense in an interactive and dynamically changing environment, ND identifies lines of 'tearing' so that

pieces can be reworked in synchrony with the overall pattern as the needs imposed by the environment change.

Together they provide one explanation for the creation and growth of the firms we see in the real world. One way to substantiate such an explanation would be to analyse the historical evidence already available to us. For example, Wedgwood Pottery (Koehn, 1997), General Electric (Baldwin, 1995), U-Haul (Silver, 1985b), and AES Corp (Waterman, 1990) all demonstrate how effectuation processes could have built large and rapid-growth firms with built-in near-decomposability in their organizational structures. More general histories of the spread of 'divisional' architectures through American industry can be found in Drucker (1947) and Chandler (1962). Today we can see numerous new examples of companies that grow through franchising, joint ventures and, more recently, through 'affiliate' programs pioneered by internet companies such as Amazon.com.

In the effectual case, the *inner* environment of the artifact – the firm – is designed in such a way that it develops an ND structure. Moreover, the lines of tearing and stitching in that structure are determined through negotiations with stakeholders, thereby partially designing the shape of the *outer* environment as well – that is, who comes on board and who does not. Thus effectuation and ND together not only design the inner environment of the artifact to fit the needs of its outer environment, but also enable the outer environment to be rebuilt to fit the inner one.

The rather unassuming idea of co-designing inner and outer environment hides an ontological commitment. For Simon's artifact this commitment is to bounded rationality. In a profound passage entitled 'Time and space horizons for design' in *The Sciences of the Artificial*, Simon wraps up into one evocative image the spatiotemporal context of human life and the sufficiency of our 'bounded' rationality to deal with it:

Each of us sits in a long dark hall within a circle of light cast by a small lamp. The lamplight penetrates a few feet up and down the hall, then rapidly attenuates, diluted by the vast darkness of future and past that surrounds it. (Simon, 1981: 178)

One consequence of the 'fitting' process between inner and outer environment is that the spatiotemporal regularities in the outer environment get mapped onto those in the inner structure. A startling example of this phenomenon is the existence of topographic maps in the brain (Kohonen, 1982). The neural segment that corresponds to recognizing signals from one part of the body – say, the thumb – is contiguous with the part that recognizes signals from a nearby part of the body, say the forefinger. In general, spatial contiguity in the outer world is mapped to spatial contiguity in the inner world.⁷

Good design also maps spatial and temporal contiguities in the outer environment to the inner (consisting of the structure of the artifact and the materials with which it is fabricated). As Simon (1996: 9) notes:

Whether a clock will in fact tell time depends on its internal construction and where it is placed. Whether a knife will cut depends on the material of its blade and the hardness of the substance to which it is applied.

Here the mapping goes from outer environment to inner. Simon also showed that the mapping can proceed in the opposite direction:

Thus, if the clock is immune to buffeting, it will serve as a ship's chronometer. (And conversely, if it isn't, we may salvage it by mounting it on the mantel at home.) (Ibid.: 9)

Because the human designing the artifact can choose which way the arrow goes (within the constraints of natural laws), the local environment itself is largely an artifact fabricated by the designer.

The importance of ontological commitments to spatiotemporal neighborhoods is that they determine how an idea is *embodied* in reality. Harking back to our earlier discussion, modularity, as a design choice, makes no such explicit ontological commitments. Modularity is an abstract organizational principle, and space/time could be treated in a modular manner (for example, division of labor on assembly lines) just as anything else could. ND can be treated as an abstract principle as well, but Simon's development of the idea in the context of artifacts, as we have argued above, was not an accidental one. The Simonian artifact's commitment to boundedly rational embodiment has explicit implications for strategic management and entrepreneurship.

The first implication is very much in line with the obvious and well-known prescription in strategy that even when a firm finds itself in a stable niche with substantial market share, such as the Big 3 auto companies in Detroit, the leading firm should continually innovate. This is because as Simon (1993c) pointed out, in a world of designed artifacts, all competitive advantages are short-lived. But the second emphasizes the counterintuitive and understudied prescription that sometimes a leading firm needs to design the very obsolescence of its own core customer segment.

This follows from the fact that the mapping between inner and outer environment is bidirectional. New markets come into existence not only in response *to* changes in tastes or technologies, but also by entrepreneurs and managers actively changing their consumers' preferences and educating them about new possibilities. As Schumpeter pointed out, 'It was not enough to produce satisfactory soap, it was also necessary to induce people

to wash' (1939: 243). In the example cited above, Detroit can bet that its core customers will not change their tastes as Tokyo induces Americans to drive hybrids; or it can actively educate them in the benefits of fuel efficiency, and if needed, actively obsolete some of its core segments without having that obsolescence thrust upon it. In other words, by taking their market as pre-existent and focusing their entire attention on *correct response*, the Big 3 are overlooking the reality that they are facing a *design choice*; that they can design markets as well as automobiles.

7.3 DESIGNING ARTIFACTS THAT DESIGN ENVIRONMENTS

The point I am trying to bring home is simple but stark. Designers of organizations design the environments we live in; and in the process they rebuild the very coordinates of our existence – who we are and who we can become; what we know and what we can learn; whom we interact with and whom we can find no time for. The fallacy of an environment impervious to the designer or a world unperturbed by artifacts is often bolstered by the comforting myth of the 'market' that is 'out there' – capable of wisely sorting out wheat from chaff from the outputs of seemingly 'intentional' but actually 'random' or 'structured' human endeavors.

That entrepreneurs (effectually or not) seek to and succeed in reshaping the environments in which they operate is easy to evidence in almost every one of their biographies and histories available to us. When Edison began making light bulbs, the 'market' did not rush to buy them. He had to work with bankers and lawyers and politicians, educating them, cajoling them and at times overcoming them. He had to remake himself and his employees into evangelists and radical activists who dreamed up costumes and parades so they could march against priests who preached against this satanic separation of heat from light. This is reminiscent of Wedgwood, who, as we saw earlier, had to build canals and bridges so he could transport his wares that embodied freedoms we take for granted today. More recently, Mary Kay Ash not only made up faces, she also helped remake women. The woman who said, 'Many times I have told the people in our organization, "If we ever decide to compare knees, you're going to find that I have more scars than anyone else in the room. That's because I have fallen down and gotten up so many times in my life"' helped make women financially and personally independent, not to mention the new market for pink Cadillacs.

Only future research can tell us how effectual the decisions and actions of these well-known entrepreneurs were. I hope through that research we

can challenge the popular ethos that has made heroes of successful entrepreneurs. Yet effectual actors are not heroic; they are determinedly pragmatic. They believe in the efficacy of small changes, the power of the actually possible. They do not often sound like great leaders; in fact, they often spout old bromides. Nevertheless they convert clichés into cathedrals – by actually rolling up their sleeves and building with materials available at hand. An effectual logic leverages locality and contingency to create novelty. The novelty it creates might sometimes end up looking like a heroic edifice, but more often than not they are actually crazy quilts – structures in which stakeholders negotiate what to stitch together and tear apart, in the process building and rebuilding themselves and their environments. Effectual making is at all times a remaking. And at all times, it embodies reality in the artifacts it fabricates, stubbornly refusing to separate ideas from actions, ideals from artifacts, the actual from the possible.

Shaw captures the quintessential flavor of effectuation through John Tarleton's ruminations as he struggles to reconcile being a maker of underwear with being a man of ideas. Tarleton's ideas are important; his restless longing to break out of the routine of his very success is necessary. But ultimately his mission, his passion, his achievement *is* the underwear itself – effectual entrepreneurship is nothing if it is not an embodied science of the artificial:

Tarleton: You're quite right, my boy. I don't mind confessing to you all that the circumstances that condemned me to keep a shop are the biggest tragedy in modern life. I ought to have been a writer. I'm essentially a man of ideas. When I was a young man I sometimes used to pray that I might fail, so that I should be justified in giving up business and doing something: something first-class. But it was no good: I couldn't fail. I said to myself that if I could only once go to my Chickabiddy here and shew her a chartered accountant's statement proving that I'd made 20 pounds less than last year, I could ask her to let me chance Johnny's and Hypatia's future by going into literature. But it was no good. First it was 250 pounds more than last year. Then it was 700 pounds. Then it was 2000 pounds. Then I saw it was no use: Prometheus was chained to his rock: read Shelley: read Mrs Browning. Well, well, it was not to be. [He rises solemnly.] Lord Summerhays: I ask you to excuse me for a few moments. There are times when a man needs to meditate in solitude on his destiny. A chord is touched; and he sees the drama of his life as a spectator sees a play. Laugh if you feel inclined: no man sees the comic side of it more than I. In the theatre of life everyone may be amused except the actor. [Brightening] There's an idea in this: an idea for a picture. What a pity young Bentley is not a painter! Tarleton meditating on his destiny. Not in a toga. Not in the trappings of the tragedian or the philosopher. In plain coat and trousers: a man like any other man. And beneath that coat and trousers a human soul. Tarleton's Underwear!

NOTES

1. These particular citations merely point to authoritative discussions; the cited scholars may stand on different sides of an issue. Descartes is for the separation of body from mind; Freeman, on the other hand, is against the separation of business from society.
2. Fabrications differ from simulations in important ways; primarily, embodiment. See Rosen (1985) for an intriguing study of this difference.
3. See the very influential essay by Friedman (1953). But see Simon (1959) for a rebuttal, and Vaihinger (1925) for the mother of all *as-if* arguments. I discuss this in more detail in Chapter 9.
4. I thank Anil Menon for illuminating discussions on these issues.
5. A banded matrix $A = (a_{i,j})$ with bandwidth w has $a_{i,j} = 0$ for $j > w + i$ and $i < w + j$. By definition a low bandwidth matrix is also a sparse one, but the converse is not true. A matrix can be sparse and still have a high bandwidth; for example, the interconnection matrix for a star graph, in which one node is connected to $n - 1$ other nodes.
6. There are unusual states of matter, but they are interesting precisely because they are, well, unusual. Even gels, which seem to ooze indiscriminately between phases, have distinct electrochemical properties from both solids and liquids. See Pollack (2001). On the other hand, gases are like loosely coupled systems, liquids less so, and solids are like tightly coupled systems.
7. As always, the brain refuses to oblige us by making this a general organizing principle. There are non-topographical mappings as well, for example the olfactory system in the cortex. Apparently, the nose knows something that the others don't.

8. Competitive advantages and entrepreneurial opportunities

In this chapter I examine the implications of effectuation for current research in strategic management and entrepreneurship. According to current scholarship, the primary concern of strategic management is the pursuit of sustainable competitive advantages; that of entrepreneurship is the pursuit of opportunities (Michael et al., 2001). However, the very existence of an ultimate source of sustainable competitive advantage has recently been questioned (Collis, 1994; Winter, 2003). By conceptualizing markets as artifacts, effectuation stands with those critiques; moreover, effectuation questions the existence of opportunities as a precondition of entrepreneurial action. The implication of the former is to highlight the role of voluntary exit in strategic management; that of the latter is to reconceptualize opportunities as outcomes of, rather than precursors to, entrepreneurship. I will examine each of these implications in turn and trace their consequences for future research in the two fields.

8.1 STRATEGY AS THE PURSUIT OF SUSTAINABLE COMPETITIVE ADVANTAGE?

Sustainable competitive advantage has been the holy grail of strategic management. Take the opening sentence of the widely cited article by Teece et al.:

The fundamental question in the field of strategic management is how firms achieve and sustain competitive advantage. (Teece et al., 1997: 509)

But it is a holy grail that has mostly proved elusive. In its pursuit, the field has experienced several paradigm shifts, including classic studies of competitive forces, game-theoretic analyses of strategic conflict, resource-based views and, most recently, perspectives based on dynamic capabilities.

There also exist critiques of the quest for a generalized theory of sustainable competitive advantage, such as Collis (1994):

Organizational capabilities, appropriately defined, can meet the conditions, articulated by the resource-based view of the firm, for being a source of sustainable

competitive advantage. However, this paper observes that there are limits to the extent of the importance of such capabilities. They are vulnerable to threats of erosion, substitution, and above all to being superseded by a higher-order capability of the 'learning to learn' variety. This suggests that there can be an infinite regress in the explanation for, and prediction of, sustainable competitive advantage. The problem is resolved by arguing that the value of organizational capabilities is context dependent, and by recognizing that the strategy field will never find the ultimate source of sustainable competitive advantage. (Collis, 1994: 143)

Collis's rhetoric suggests that the non-existence of the holy grail is cause for disappointment and compromise – forcing us to set our sights lower, as it were. But perhaps the question more pertinent than the source of competitive advantage would be, 'What role would strategic management play in a world in which ultimate sources of sustainable competitive advantages did exist?' Wouldn't it mean that a company that found such a source would end competition within its industry? Ergo, we would end up with an economy of monopoly markets (pun intended)! All we would be left with, then, is a strategic management equivalent of the 'no trade theorem' in financial economics (Milgrom and Stokey, 1982).

An effectual perspective suggests that it is more meaningful, not to mention more interesting, to engage in a strategic management that either acknowledges and appropriates locality and contingency, or does not seek novelty in an exclusively adaptive approach, or both. Several footprints in the sand already exist along these lines. Consider, for example, the 'hot stove effect' identified by Denrell and March:

We show how the reproduction of successful actions inherent in adaptive processes, such as learning and competitive selection and reproduction, results in a bias against alternatives that initially may appear to be worse than they actually are. In particular, learning and selection are biased against both risky and novel alternatives. Because the biases are products of the tendency to reproduce success that is inherent in the sequential sampling of adaptation, they are reduced whenever the reproduction of success is attenuated. In particular, when adaptation is slowed, made imprecise, or recalled less reliably, the propensity to engage in risky and new activities is increased. (Denrell and March, 2001: 523)

Other examples include: enactment and sensemaking (Weick, 1979, 1995); decision-making in high-velocity environments (Eisenhardt, 1989); improvisation (Moorman and Miner, 1998); exaptation (Dew et al., 2004); and so on. A particularly noteworthy attempt is that of Winter (2003). Building directly upon Collis's formulation of higher-order capabilities, Winter has introduced the notion of 'ad-hoc problem solving' as follows:

From a logical point of view, the 'existence' of higher order rates of change is in question only in the mathematical sense that some derivatives might not exist;

and from a computational point of view, a time sequence of $N + 1$ values of a variable suffices to compute one value of the N th order rate of change. But if dynamic capabilities are similar to capabilities in that they involve patterned activity oriented to relatively specific objectives, then there is no guarantee that the organizational processes governing high-order change are highly patterned, and substantial reason to think otherwise. In this important substantive sense, high-order dynamic capabilities do not necessarily exist. (Winter, 2003: 992)

Effectuation stands with these developments and against any philosophical necessity for an ultimate source of sustained competitive advantage. In this view, human action is fundamentally creative. Such creativity calls for a 'satisficing' approach (Simon, 1997; Winter, 2000) to competitive advantage that need be sustained only for limited periods of time. In other words, we need markets that are sufficiently stable for one useful innovation to be fully paid for and the next one to bubble up. In such a universe, exit strategies become far more important than they currently are. Instead of chasing immortality, an effectual strategic management will focus on vitality and creativity tied together with voluntary exit. Products, business units, firms and markets will not only be seen as mortal, but that mortality itself will be seen as an effective way to build economic development and prosperity. Suicide and euthanasia would be part of a healthy portfolio of effectual strategies.

This idea, while expressed rather provocatively, is neither new nor revolutionary. The joint stock company was invented so that creative individuals could assume risk without putting their lives and livelihoods on the line for economic growth. Limited liability and the resultant immortality of the corporation were instruments to allow individuals and societies to live well while continuing to push the frontiers of technological and catallactic progress. But over the centuries, they have come to imply an instrumental view of individuals and societies as serfs in the continual struggle to keep corporations alive. The corporation can die only as a result of this competitive struggle and may not be terminated or surgically excised in the service of new purposes and new ways of living well. Nor can markets be manufactured and destroyed through willful human action.

What would a strategic management that took an instrumental view of exit look like? The historian Rowena Olegario (1997) provides a glimpse in her description of IBM's strategizing about System/360:

During the 1950s and 1960s, IBM's managerial hierarchy faced the critical problem of building consensus between two very different groups of people: engineers on one side, marketers and professional managers on the other. In the early 1950s, when IBM first entered the electronic computer market, the two sides had come into direct conflict. The marketers and managers, led by Thomas J. Watson, Sr., resisted computers because they represented such a heavy capital

investment that the company's financial health might be endangered. Also, should computers be a success, the lofty position of marketers within the firm might be rendered less influential. On the other side were a group of electrical engineers, who were able to convince Thomas J. Watson, Jr. that computers would revolutionize the data processing industry. (Olegario, 1997: 384–5)

Again, in the 1960s:

The company invested \$5 billion in System/360, about three times its revenues in 1960. It hired more than 60,000 new workers, bringing total employment to 190,000 in 1966 and 325,000 by 1970. Developing System/360 put the company under tremendous pressure. It was an all-or-nothing gamble. IBM aimed to replace existing computers, including the 1401, its best selling product at the time, with a technology that had never before existed in the marketplace. In addition, the new machines were targeted at both the scientific and business markets, which had very different computing needs. The whole 360 strategy alienated many of IBM's own employees, who had a stake in the company's older technologies. Tom Jr. and Vin Learson, the executive in charge of the 360 project, had to whip all divisions into line to support the new strategy. Learson, writing to a reluctant colleague, laid down the corporate policy thus: 'By 1967 the 1401 will be dead as a Dodo. Let's stop fighting this.' (Olegario, 1997: 367)

Expert entrepreneurs also tell stories about betting the company on bold conjectures bolstered by a few passionate and committed stakeholders. In the IBM example above, strategic decisions were not made in the absence of customer feedback. Yet they were not also exclusively predicated on that feedback. Also, IBM proceeded without a clearly pre-existing market with well-defined streams of future cash flows and psychologically comforting projections of profit margins. Instead, it leveraged its established customer base and network of relationships to shape and create the market for revolutionary new product lines. The company used prediction not to predict what the market for its new products would be, but predicting and carrying out the extinction of its current product. This prediction was combined at the same time with the insistence on the necessity to invest in what may or may not be successful products in the future, but which were highly likely to be within the company's control to shape into future markets. As Vin Learson put it, 'We did what Charles Kettering, an engineering genius and president of the General Motors Research Division, always advised against: we put a delivery date on something yet to be invented' (Olegario, 1997: 392).

The reconceptualization of markets as artifacts involves a fundamental shift in our thinking, resembling the historical shift from a hunter-gatherer to an agricultural society. From an effectual perspective, firms are implements in the hands of stakeholders who sow, nurture and ultimately reap *mortal* markets. The relationship between such artificial markets that

leverage the locality and contingency of competitive advantages is echoed in the relationship between entrepreneurship and the creation of new opportunities.

8.2 ENTREPRENEURSHIP AS THE PURSUIT OF OPPORTUNITIES?

Traditionally entrepreneurship research had mostly been focused on the attributes of entrepreneurs and success factors related to new venture performance. More recently, the focus of the field has shifted to the study of entrepreneurial opportunities (Busenitz et al., 2003). Entrepreneurship researchers nowadays begin with the acknowledgment that the phenomena of primary interest to them – namely, opportunities – occur in the absence of markets (Venkataraman, 1997). The intellectual roots of this growing interest in entrepreneurial opportunities can be traced not only to Schumpeter (1934) but also to Kirzner (1973), whose views Venkataraman (1997) deemed the strong and weak premises of entrepreneurship, respectively. In a nutshell, the Schumpeterian entrepreneur disrupts equilibrium through her innovation; the Kirznerian entrepreneur is alert to disequilibria and works to bring the economy back to equilibrium. Shane (2003) pointed out that most entrepreneurial opportunities are likely to be Kirznerian rather than Schumpeterian.

What are entrepreneurial opportunities? Are they phenomena to be explained by entrepreneurship research, or are they to be taken as givens in our analyses of what entrepreneurs do and how well entrepreneurial firms perform? Currently, the majority of approaches seem to suggest the latter. For example, Shane and Venkataraman use Casson's definition of entrepreneurial opportunity:

To have entrepreneurship, you must first have entrepreneurial opportunities. Entrepreneurial opportunities are those situations in which new goods, services, raw materials, and organization methods can be introduced and sold at greater than their cost of production (Casson, 1982). Although recognition of opportunities is a subjective process, the opportunities themselves are objective phenomena that are not known to all parties at all times. For example, the discovery of the telephone created new opportunities for communication, whether or not people discovered those opportunities. (Shane and Venkataraman, 2000, p. 220)

Shane extends this definition:

I define entrepreneurial opportunity as a situation in which a person can create a new means-ends framework for recombining resources that the entrepreneur believes will yield a profit. (Shane, 2003: 18)

This definition has its problems, just as the definition of core concepts in any major field of inquiry does. And, as in the case of markets in the social sciences, entrepreneurial opportunity is mostly taken as a given in our scholarship.¹

Just as the neoclassical entrepreneur (the producer) seeks to fulfill current and/or latent demand and capture market share, and the sociological/evolutionary entrepreneur seeks to adapt to and survive within extant markets, the Schumpeterian and Kirznerian entrepreneur seeks to recognize, discover, explore and exploit given opportunities. In fact, Shane (2003) identifies several sources for both types of opportunities that precede the actions of the entrepreneur. Schumpeterian opportunities, he argues, arise out of technological, political/regulatory and social/demographic changes; Kirznerian opportunities are largely idiosyncratic and arise out of the errors and omissions of prior decision-makers, which have caused surpluses and shortages.

Schumpeter and Kirzner in their original writings have a more complicated position on the existence of opportunities and the entrepreneur's role in discovering them. Note, for example, Kirzner on this topic:

Entrepreneurial knowledge is a rarefied, abstract type of knowledge – the knowledge of where to obtain information (or other resources) and how to deploy it.

This entrepreneurial alertness is crucial to the market process. Disequilibrium represents a situation of widespread ignorance. This ignorance is responsible for the emergence of profitable opportunities. Entrepreneurial alertness exploits these opportunities when others pass them by. G. L. S. Shackle and Lachmann emphasized the unpredictability of human knowledge, and indeed, we do not clearly understand how entrepreneurs get their flashes of superior foresight. We cannot explain how some men discover what is around the corner before others do. (Kirzner, 1979: 8)

As I have argued in previous chapters, the answer to Kirzner's mystery is that entrepreneurs generally do not have any 'flashes of superior foresight'. Instead, expert entrepreneurs use a logic of non-predictive control to construct the so-called opportunity through a process of effectual interaction with stakeholders.

8.3 WHERE DO ENTREPRENEURIAL OPPORTUNITIES COME FROM?

If we do not begin our scholarship taking either markets or opportunities as already existing or latent in society, where do we begin? There are two ways to approach this question. I shall first lay out the philosophical argument in brief and then quickly move to the data for specific answers.

If we take as our starting point existing theories such as the neoclassical economic framework or its forefather, the philosophy of rational choice, we will have to explain entrepreneurial activity or an effectual logic as deviations from received wisdom. Instead, in the spirit of Popper (2002), I would like to make the 'bold' conjecture² that entrepreneurship is not an unexplained anomaly or a taken-for-granted prior, but that it actually *generalizes* economics. In other words, economics studies those particular cases where the market has already been created or where industries and competitive landscapes already exist. Entrepreneurial opportunity, in this view, has to be the opportunity to create the primitives that these sciences take as given. The primitives include, among other things, preferences, demand functions, competitive landscapes and sociopolitical institutions.

In my view, entrepreneurial opportunities begin where everything of importance in human affairs begins – in the 'world of pure experience' that William James (1996) embraced and sought to understand. In this world, knowledge is never completed and opportunities are always in-the-making, for, as Jamesian pragmatism would have it, the universe itself consists of worlds-in-the-making. In James's vivid rhetoric:

To continue thinking unchallenged is, ninety-nine times out of a hundred, our practical substitute for knowing in the completed sense. As each experience runs by cognitive transition into the next one, and we nowhere feel a collision with what we elsewhere count as truth or fact, we commit ourselves to the current as if the port were sure. We live, as it were, upon the front edge of an advancing wave-crest, and our sense of a determinate direction in falling forward is all we cover of the future of our path. It is as if a differential quotient should be conscious and treat itself as an adequate substitute for a traced-out curve. Our experience, *inter alia*, is of variations of rate and of direction, and lives in the transitions more than in the journey's end. (James, 1996: 69)

In other words, opportunities are made as well as found; and as empirical evidence shows, they are perhaps as much the outcomes of what entrepreneurs do as the data on which entrepreneurs base their actions. This view of action as a root cause of novelty in the world and not as the mere implementation of creative thought (Kirzner's 'flashes of superior foresight' being an example of creative thought) is endorsed by recent developments in social philosophy. Joas (1996), for example, argues in great detail to generalize the theories of social action to include creative action, with rational action being a special case where assumptions of corporeality, situation and sociality hold. He questions the wisdom of modeling creativity as a mere deviation from rationality:

Just as fixating on an enemy affects an individual as profoundly as does emulation of a role model, so too, sociological action theory is permeated with the

theory of rational action precisely because it sees types of action only as gradations of deviation from rationality in the full sense of the concept and not a unique phenomena in their own right.

The question is whether this picture actually agrees with the facts. (Joas, 1996: 35)

To the extent that entrepreneurial action is a form of creative action, it can be modeled as a form of action more general than rational economic action based on Joas's framework, as well as within those of other pragmatist philosophers such as Rorty's exposition of the strong poet, and Goodman's ways of world making. In sum, when we put together relevant ideas from pragmatists such as James, Dewey, Rorty, Goodman and Davidson, we are led to the necessity of beginning our understanding of entrepreneurial opportunities in the mud of common human experience. And it is my contention that such an analysis will lead us to conclude that these opportunities are a result of the efforts of particular entrepreneurs striving to construct stable economic and sociological institutions, including the organizations and markets we see in the world. We can easily see this if we ask ourselves, '*How* do people become entrepreneurs?' instead of the more traditional question, 'Why do some people become entrepreneurs, while others do not?' or its corollary, 'Why do some perceive entrepreneurial opportunities and act upon them, when others do not?'

The following is a rough taxonomy of some of the ways in which people become entrepreneurs.

8.3.1 Habitual Entrepreneurship

Some people whose parents are entrepreneurs decide either to carry on with the family business or become entrepreneurs in their own right. This is in line with any other profession and tends to be more pronounced in more traditional societies such as India, where there is a distinct merchant/business caste, or class. In more modern societies such as the USA, even children of non-entrepreneurs become entrepreneurs because of early experiences such as a successful newspaper route (Joe O'Donnell, founder of Boston Concessions) or a business selling garbage bags door to door as a 12-year-old (Mark Cuban, founder of Broadcast.com and owner of the Dallas Mavericks).

8.3.2 Necessity Entrepreneurship

There exist a variety of trade-offs between the labor market and entrepreneurial ventures. People get fired from their jobs and become entrepreneurs. Or they quit their jobs because the parent company decided not to

commercialize their ideas and inventions. Some people are simply unhireable, say, due to lack of education and language skills (immigrant entrepreneurs, for example) or criminal backgrounds (drug lords and protection racketeers, for example), and so become entrepreneurs.

8.3.3 Incentivized Entrepreneurship

Sometimes individuals are induced to become entrepreneurs. Governments in almost every country today offer seed money and other incentives to encourage local citizens to start firms and commercialize government-owned technologies (e.g. Batelle National Labs' Entrepreneurial Leave Program). Microfinance organizations as well as non-profit international aid organizations, governmental and non-governmental, also cajole and/or strong-arm a variety of citizens in many developing countries to start ventures or become self-employed. Increasingly, business schools offer entrepreneurship as a career choice, collaborating with and even co-founding incubators for which they provide a steady pipeline of new entrepreneurs.

8.3.4 Celebrity Entrepreneurship

Some individuals are fortunate enough to experience extraordinary success in their chosen professions. They then decide to found for-profit or non-profit organizations to create pathways for the less fortunate to find their way to financial independence. Examples abound from show business (Jodi Foster's Egg Pictures, Newman's Own sauces), professional sports (Magic Johnson's theaters), and other areas of the limelight (Oprah Winfrey's plethora of initiatives).

8.3.5 Social Entrepreneurship

People who face extraordinary misfortunes too become entrepreneurs. Some social entrepreneurs such as Candy Lightner, who founded Mothers Against Drunk Driving after losing her child in a DUI (driving under the influence) accident, and Sharon Daugherty, founder of Innermotion, who uses dance to rehabilitate victims of sexual abuse, are cases in point. Other social entrepreneurs such as Peter Cove, who founded the for-profit firm America Works to move welfare recipients into the workforce, also attest to the fact that entrepreneurship (for-profit, non-profit, or hybrid) is an effective way to solve problems in society. (More on this in Chapter 9.)

Entrepreneurship has heretofore been seen as the result of people perceiving an entrepreneurial opportunity; I would like to argue instead that entrepreneurial opportunities are predominantly the result of people acting

in entrepreneurial ways, which includes acting upon perceived opportunities. So what does it mean to act entrepreneurially? In a nutshell, acting entrepreneurially involves acting as though the world is largely artificial – it involves taking Chapter 7 very seriously.

8.4 THE ENTREPRENEURIAL METHOD

If we gather relevant nuggets from Chapter 7 to examine entrepreneurial opportunities, we arrive at the following two premises about what human beings do and two conjectures about how opportunities come to be:

Jamesian premise: *People strive to live well.*

Simonian premise: *People strive to construct their environments.*

My first conjecture based on these premises is that effectual entrepreneurship is a powerful tool in both endeavors.

My second conjecture is that profitable opportunities are created in those societies and epochs in which people strive to live well and construct their environments using entrepreneurial means and methods.

A historical analogy might help to clarify matters. The physical universe is for the most part the same as it was before Francis Bacon spelled out the elements of the scientific method in *The New Organon* in the 16th century. Yet, armed with the scientific method, sociopolitical and economic institutions could be created that significantly accelerated the pace of scientific progress, which, in turn, enabled a continuing explosion of technological innovations. Understanding the scientific method was crucial in making systematic technological inventions possible. As Alfred North Whitehead remarked, ‘The greatest invention of the nineteenth century was the idea of invention itself’.

Similarly, it is my contention that there exists an entrepreneurial mode of reasoning and action that creates profitable opportunities in the world.³ Just as the scientific method enables the creation of technological artifacts from existing materials of the real world, the entrepreneurial method enables the creation of social and economic artifacts through the actions of individual entrepreneurs and their interactions with a variety of stakeholders in the real world. Understanding the entrepreneurial method and building effective institutions based on it will therefore be the key to the creation of economic opportunities. (More on this in Chapter 13.)

This line of argument has important implications for policy and research. Development efforts based on the premise that entrepreneurs go where economic opportunities are look very different from efforts based on

the premise that opportunities get created where the entrepreneurs are. In the former case, we invest in creating opportunities – that is, we deploy our resources toward bringing the latest technologies and the required infrastructure to the regions we are interested in developing. In other words, we invest in incentives and inducements for attracting high-tech entrepreneurs by trying to create opportunities for them locally, say, through a biotech incubator.

If instead we accepted the premise that entrepreneurs create economic opportunities, we would invest our development resources in entrepreneurship education and support local entrepreneurs who seek to leverage local resources to create opportunities that do not depend upon technologies transplanted from other regions of the world. Prahalad and Hammond (2002), for example, have shown how even multinational corporations can benefit from local solutions created in developing countries that usually pass under the radar of major economic-development initiatives. And the social venture Ashoka leverages the efforts of social entrepreneurs in remote corners of the world.

It is obvious that both approaches (bringing opportunities to entrepreneurs and supporting entrepreneurs in the creation of opportunities) are useful and necessary in fostering economic development. But most of our research and policy efforts are invested in the premise that entrepreneurs primarily ‘discover’ what already exists. The sources of these opportunities are attributed to exogenous technological progress and social changes rather than to the entrepreneurial method. There is, however, an ongoing debate among scholars in the field about the subjective versus objective nature of entrepreneurial opportunities. For example, scholars such as Gartner et al. (2001) have argued that opportunities do not exist ‘out there’ but are enacted in the sense of Weick (1979). The thrust of my thesis takes a different tack on this debate. The question here is not whether opportunities exist objectively in the world or whether they exist primarily in the entrepreneurs’ minds. Instead, the key debate concerns whether opportunities make entrepreneurs or whether entrepreneurs create opportunities.

Some pragmatist philosophers and Simonian scientists offer a plausible answer: the world exists – that is not in question, however one perceives it or interprets it or not. But that does not mean that technologies or opportunities cannot be *made*, and can only be *found*. On the supply side, technologies have to be invented, fabricated, constructed, made – from the materials in the world. The scientific method effectively enables such making. So, too, I contend on the demand side: opportunities and markets have to be invented, fabricated, constructed, made – through the peculiar processes of effectual action and interaction the entrepreneurial method comprises.

The markets that the social sciences take as primitives in their analyses are artifacts that are constructible through the entrepreneurial method. Entrepreneurial opportunities, therefore, are the corridors that entrepreneurs construct leading from the daily aspirations of all human beings to live well and obtain greater control over their particular destinies to the organization of preferences, utilities, institutions and technologies that the social sciences seek to study under the rubric of ‘markets’.

NOTES

1. In all fairness, Venkataraman has co-authored a paper with me that is one of the exceptions.
2. Popper on the falsificationist approach: ‘I can therefore gladly admit that falsificationists like myself much prefer an attempt to solve an interesting problem by a bold conjecture, even (and especially) if it soon turns out to be false, to any recital of a sequence of irrelevant truisms. We prefer this because we believe that this is the way in which we can learn from our mistakes; and that in finding our conjecture was false we shall have learnt much about the truth, and shall have got nearer the truth’.
3. Effectuation could be one candidate for that mode, but more research is needed before we nominate it to the ticket.

9. Philosophy and methodology of effectual economics

Effectuation is a logic for practicing entrepreneurship as a method and studying it as a science of the artificial. In Chapter 3, I defined a *logic* as an internally consistent set of criteria that forms a clear basis for action upon the world. Of course, that is not the only possible definition of logic. There are as many mathematical and other types of logics today as there are algebras and geometries and philosophies. But that was not always the case.

In 1914, flushed with the completion of the monumental *Principia Mathematica* four years earlier, Russell proclaimed, ‘Logic is the essence of philosophy’. At the time, it appeared as though some things had been resolved for all time to come. As Barrett (1978) points out, mathematical logic became a sort of *pons asinorum*, a bridge one had to cross to get to real estate of any value at all in areas of intellectual development. However, in one of those twists in the history of ideas, that seemingly solid bridge dissolved in the later work (*Philosophical Investigations*) of Russell’s most brilliant student Wittgenstein, who, in his earlier work, *Tractatus Logico-Philosophicus*, actually tried to cross it to reach the promised land. Russell himself reversed his position to conclude that logic is always insufficient and that every logic needs a philosophy. In his dedication to *Models of Discovery*, Simon quoted Carnap to argue for science what Barrett argues for logic: that one must do science philosophically and philosophy scientifically.¹

So what philosophy would lift the sails of an effectual logic? Or those of an artifactual science of entrepreneurship? Utilitarianism provides such wind for a large portion of positive economics as it is professed today. But if we chose to attempt the task of building an *effectual* economics, where could we begin? This chapter is an early speculation on the candidacy of pragmatism for that job.

9.1 WHAT IS PRAGMATISM?

The philosophy of pragmatism is not easy to define. It has been used and developed in a variety of ways by a number of thinkers since C.S. Peirce

and William James. Even Peirce and James did not quite agree on what pragmatism meant. Peirce's metaphysical writings contain a speculative, idealistic version of pragmatism which he called 'pragmaticism' in order to distinguish it from some of James's ideas. It is telling that Papini (1927 [1913]) wrote in the opening paragraph of his collection of articles introducing pragmatism to Italian philosophers: 'Pragmatism cannot be defined. Whoever gives a definition of Pragmatism in a few words would be doing the most antipragmatic thing imaginable' (Papini, 1927 [1913]: 339).

Yet there is some consensus that pragmatism is an open-universe philosophy. In my view, this means it posits a universe in which there is a genuine role for human action, a space in which real choice is feasible and required. James and other pragmatists such as Nelson Goodman have talked about 'worlds in the making'. This refers to a notion very close to Simon's insistence that natural laws constrain but do not determine our designs. Similarly, the pragmatist recognizes that there exist things outside her control but she nevertheless refuses to relinquish control over or responsibility for her own destiny. A simple example brings the point home. I told my students once that I could never be a basketball star since I was too short. And the pragmatists in the class, who had perhaps learned effectuation a little too well, countered that I could start a league for short players!

9.2 PRAGMATISM AS METHOD

In general, the pragmatist's approach to any problem, fact, or course of action is practical and instrumental, rather than essentialist or utopian. The pragmatist is interested in how things work more than in how things *really* are, more focused on what is useful than in what is *true* in some cosmic context-free sense. The pragmatist actor, therefore, does not seek to discover some monolithic idea of the Truth – and own it and exploit it in some way. Whether the all-important idea is 'God' or 'gravity' or 'market', the pragmatist is not chasing the holy grail or even *a* holy grail. Instead, she seeks to make grails, mend them, and remake them into urns or other useful artifacts. As James (1907) puts it:

But if you follow the pragmatic method, you cannot look on any such word as closing your quest. You must bring out of each word its practical cash-value, set it at work within the stream of your experience. It appears less as a solution, then, than as a program for more work, and more particularly as an indication of the ways in which existing realities may be *changed*.

Theories thus become instruments, not answers to enigmas, in which we can rest. We don't lie back upon them, we move forward, and, on occasion, make nature

over again by their aid. Pragmatism unstiffens all our theories, limbers them up and sets each one at work. (James, 1907: 21; italics in the original)

To be actionable and capable of changing extant realities, the pragmatist's ideas have to be rooted in the actual, and not in some fantastic 'vision' unrelated to here and now. Pragmatism, in this sense, is the very antithesis of a utopian or purely idealistic approach. Every utopia, marxist or libertarian, technological or luddite, ELF or PETA, involves some ideal world B that rejects specific aspects, say a_i , of the actual world A . Because the idealist wants to achieve B , he begins to strive against a_i . If only we did not have to pay taxes; if only no one drove SUVs; or if only there were no Jews, or bourgeoisie, or homosexuals or 'others' of one kind or another; and so on. In the extreme case, the entire vision of B gets encapsulated in this more immediate and concrete goal, be it as simple as 'Let's recycle!' or as horrendous as 'Let's shoot the bastards!'

Let us consider the case of the demand for large SUVs and examine what avenues a utilitarian as opposed to a pragmatic approach might offer to solve the problem. If we take the position of pure consequentialism² (Anscombe, 1958), we will have to legislate the taste for large SUVs because they pollute the environment. Measures may range from banning vehicles that offer low gas mileage to imposing prohibitive taxes on them. If we take the more hedonistic position of free market economics, we will abide by market demand even when it sacrifices the environment. We can, of course, also try to *shape* tastes and demand through social pressures such as boycotts and cause-related marketing.

Pragmatism would strive against any such monistic notion or universal formula of ideal action. Instead, an effectual logic that embodies pragmatism would take both the health of the environment and the taste for large SUVs as design constraints. As I have shown in the previous chapters, effectuation would seek a variety of solutions to the design problem. Such effectual solutions could be implemented through entrepreneurial ventures that help commercialize new technologies (such as fuel-efficient engines and alternative fuels), reformulate people's driving habits (by creating telecommuting services, for instance), redesign manufacturing practices (such as cradle-to-cradle designs), create new varieties of urban and suburban communities (such as pedestrian malls), and even turn the problem into a competitive advantage for a social venture that invests its profits in some of the solutions listed above (such as car-wash franchises that allocate a percentage of profits to develop alternate fuels).

Notice that the design task here is not one of trade-offs or compromise. It is not to figure out what sacrifices in tastes to make as a price for aggregate welfare; nor does it imply throwing one's hands up in the face of an

inexorable human nature. The pragmatic universe is pluralistic in both tasks and tools. Both tastes and ideals are changeable; fulfilling a variety of tastes and achieving aggregate welfare are both intrinsic components of the continual striving to live well in the world. The pragmatic method would deny a strict dichotomy between hands-off exchange and collective action.

Instead, an effectual logic can embody a pragmatist philosophy in the following way. The pragmatist effectuator will look carefully at the actual world and figure out courses of action, however local and contingent, that are both doable and worth doing. Then, through interactions with others, effectuators will refine the designs of their solutions even as they transform one another's tastes and the exigencies of the environment into viable and valuable new artifacts. Together their actions begin transforming the actual world A into a variety of new possibilities $b_1, b_2, b_3 \dots$ and so on, several of which could not even have been dreamed of without actually implementing the effectual process.

Goodman's pragmatist conception of 'entrenchment' might be relevant in this connection. In Goodman's use of the term in epistemology, a predicate is 'entrenched' if it has served certain uses in successful prediction in the past, or is connected in some way to predicates that have. Entrenched predicates are assumed to be projectible and thus useful for the purposes of induction. Goodman's notion of entrenchment echoes Hume's appeal to custom or habit as well as James's exposition of the importance of habit. The pragmatist does not embrace change merely for the sake of change; yet her conception of change is pluralistic and her striving for new worlds is continuous.

The pragmatist outlook is, as the legal scholar and judge, Richard Posner (1995), explains:

forward-looking, valuing continuity with the past only so far as such continuity can help us cope with the problems of the present and of the future. 'We create the past from a sense of what can be done in the present.' The pragmatist remembers Santayana's dictum that those who forget the past are condemned to repeat it; but he also remembers T.S. Eliot's admonition (in 'The Dry Salvages') 'Not fare well,/But fare forward, voyagers,' and Ezra Pound's slogan, 'Make it new!' (Posner, 1995: 4)

In the conventional view, any concept such as entrenchment might appear antithetical to the very idea of entrepreneurship. Take Schumpeter's definition of entrepreneurship as 'creative destruction', for example. In his famous essay on the topic, Schumpeter argued that the history of capitalism is a history of revolutions. He gave several examples including that of the transportation industry from 'the mail-coach to the airplane' (Schumpeter, 1975 [1942]). But when Loasby looked into the history of British Rail, he

found that wagon manufacturers modified their factories to produce the first railroad cars!³ In recent papers on the subject, Brian Loasby (1998) has brought together ideas from Marshall, Knight, Shackle and Penrose, with the empirical work of Fransman (1995) and Patel and Pavitt (1997) to make a detailed and careful case for continuity in innovation:

[l]ocal and temporary equilibria may serve very well to indicate the knowledge and relationships – connections of various kinds – on which people may reasonably rely in order to construct useful novel connections. Innovation is carried by continuity, and continuity may be expressed by an appropriate concept of equilibrium, applied to particular structures of knowledge, institutions, or organisation. (Loasby, 2001: 409)

One way innovation happens through the transformation of extant realities into new possibilities is by asking not only *what can I do* with the means available to me, but also *what else can I do* with them? Such a process results in *exaptations* (Gould and Vrba, 1982), features that have been co-opted for their present role from some other origin. Mokyr describes exaptation as follows: ‘The basic idea is that a technique that was originally selected for one trait owes its later success and survival to another trait which it happens to possess’ (Mokyr, 2000: 57).

Gould and Vrba noticed that the term adaptation subsumes two meanings: *historical genesis* and *current use*. But the historical genesis of a trait and its current use may not always be congruent; in fact, they may have completely different causes. Take the case of the self-serve mailing stations recently introduced by the US Post Office. These machines allow the customer to perform such tasks as mailing letters and parcels, and buying stamps. But the stamps that come out of this machine are different from those that are dispensed over the counter or even through stamp vending machines. I enquired why the self-serve stations dispensed very thin rectangular sheets of 18 stamps instead of the regular booklets of 20. I found out that these self-serve stations were actually ATMs with a weighing machine connected to them. So the sheets of stamps were designed to fit the exact dimensions of a dollar bill! ATMs, in this case, were *exapted* to a new use with minimum disruption in their *entrenched* use, or the use they were originally *adapted* to. Mokyr (2000) has shown that exaptations are pervasive in the history of technology and markets; and Dew et al. (2004) trace out the economic implications of exaptations.

This pragmatic notion of new possibilities arising out of entrenched actualities encompasses not only technological innovations and managerial practices but also the effectual interactions the entrepreneur engages in with other stakeholders, as we saw in Chapter 5. But this idea of radical innovation through a continuous process of change begs the question as to

the role of contingency. To what extent is the pragmatist actually acting upon the world as opposed to being a mere instrument of contingency? If she is not tied to immutable ideals and a clear vision, how can she not be at the mercy of chance and caprice? Modern pragmatists such as W.V. Quine, Donald Davidson and Richard Rorty provide relevant contributions to resolve this puzzle.

9.3 THE EFFECTUAL ENTREPRENEUR AS STRONG POET: THE ROLE OF CONTINGENCY

Richard Rorty provides an explanation based on contingency for the historical changes in Europe due to the French Revolution and the Romantics:

Europe did not *decide* to accept the idiom of Romantic poetry, or of socialist politics, or of Galilean mechanics. That sort of shift was no more an act of will than it was a result of argument. Rather, Europe gradually lost the habit of using certain words and gradually acquired the habit of using others. (Rorty, 1989: 6)

Rorty explains further:

What the Romantics expressed as the claim that imagination, rather than reason, is the central human faculty was the realization that a talent for speaking differently, rather than for arguing well, is the chief instrument of cultural change. (Rorty, 1989: 7)

I am convinced we would find that these speech habits changed as much through the contingency of *artifacts* that embodied the technologies enabled by Galilean mechanics as through the contingency of *language* in the writings of the Romantic poets. Brian Loasby makes similar arguments for how technological change takes hold and new habits of consumption and demand, and therefore, new markets, form. Similarly, Rorty's description of the *methods* of cultural change as the contingency of language – i.e. speaking differently – echoes the effectual entrepreneurs' emphasis on *doing* things differently, rather than predicting and planning better, as the chief instrument of social change.

Rorty explains the role of contingency in making new worlds by referring to the 'strong poet' – an idea introduced by Harold Bloom to signify poets who 'misread' their predecessors, refuse to accept their authoritative voices, and seek to influence rather than be influenced by them. In Rorty's words:

Only poets, Nietzsche suspected, can truly appreciate contingency. The rest of us are doomed to remain philosophers, to insist that there is really only one true

lading list, one true description of the human condition, one universal context of our lives. We are doomed to spend our conscious lives trying to escape from contingency rather than, like the strong poet, acknowledging and appropriating contingency. (Rorty, 1989: 28)

I would like to point out that nobody thrives better on acknowledging and appropriating contingency than the effectual entrepreneur. It is in this sense that effectual entrepreneurs are to a socioeconomic system what a strong poet is to transformative politics and culture. The effectual entrepreneur acknowledges and appropriates contingency not by redescribing reality in words but by remaking it into new products and services that *embody* new ways of living and being and meaning for herself and her stakeholders. Spence Silver did not intend to invent Post-It notes. Given the invention of a strange glue that did not stick well, he imagined new uses for it that others also found useful and worth paying for. Rob Glaser did not set out to 'give voice to the mute web'. But he translated his own positive reaction to the World Wide Web into something others like him would find valuable. Other entrepreneurs have similarly taken contingencies and transformed them into viable and valuable new markets. Effectuation, as I have explained in detail in Chapter 4, seeks to *leverage* rather than *avoid* contingencies. But it may not hurt to look at yet another example. Let us examine the role of contingency in the following narrative from Pierre Omidyar, founder of eBay:

I can tell you, without the ability to prepare for the unexpected . . . There wouldn't be an eBay today. The key is recognizing that no matter how convinced you are in the power of your own ideas . . . Sometimes, ideas have ideas of their own. That's certainly true in terms of system design. Almost every industry analyst and business reporter I talk to observes that eBay's strength is that its system is self-sustaining – able to adapt to user needs, without any heavy intervention from a central authority of some sort. So people often say to me – 'When you built the system, you must have known that making it self-sustainable was the only way eBay could grow to serve 40 million users a day.' Well . . . nope. I made the system self-sustaining for one reason: Back when I launched eBay on Labor Day 1995, eBay wasn't my business – it was my hobby. I had to build a system that was self-sustaining . . . Because I had a real job to go to every morning. I was working as a software engineer from 10 to 7, and I wanted to have a life on the weekends. So I built a system that could keep working – catching complaints and capturing feedback – even when Pam and I were out mountain-biking, and the only one home was our cat.⁴

If I had had a blank check from a big VC, and a big staff running around – things might have gone much worse. I would have probably put together a very complex, elaborate system – something that justified all the investment. But because I had to operate on a tight budget – tight in terms of money and tight in terms of time – necessity focused me on simplicity: So I built a system simple enough to sustain itself.

By building a simple system, with just a few guiding principles, eBay was open to organic growth – it could achieve a certain degree of self-organization. So I guess what I'm trying to tell you is: Whatever future you're building . . . Don't try to program everything. 5 Year Plans never worked for the Soviet Union – in fact, if anything, central planning contributed to its fall. Chances are, central planning won't work any better for any of us.

Build a platform – prepare for the unexpected . . . And you'll know you're successful when the platform you've built serves you in unexpected ways. That's certainly true of the lessons I've learned in the process of building eBay. Because in the deepest sense, eBay wasn't a hobby. And it wasn't a business. It was – and is – a community: An organic, evolving, self-organizing web of individual relationships, formed around shared interests. (Omidyar, 2002)

This narrative is not atypical of the early life histories of most great companies founded by entrepreneurs. Pragmatism as a philosophy has seen a revival in recent times. It is exerting a discernible influence in epistemological, political, literary and legal thought (Davidson, West, Rorty, Posner). But in the phenomenon of entrepreneurial expertise, we can observe it in action. Effectual entrepreneurship lives, breathes, and *does* pragmatism. In other words, effectuation puts pragmatism to work in the world by making it actionable. In an effectual logic, action is primitive; action is necessary for ideas to matter and words to acquire meaning; and action transforms matter and experience into useful artifacts. This effectual action may, however, find its distinct philosophical stance in pragmatism.

But does this mean that effectual entrepreneurs have to be pragmatists? The simple answer to that is, No! Newton was an alchemist. That did not make his method of investigating optics any less 'scientific'. Similarly, effectual entrepreneurship may be pragmatic even if effectual entrepreneurs are not pragmatists in their personal philosophies. They may be Kantian or postmodern, twice-born or infidel, colorful or mundane, even simply banal or wicked. In an effectual universe, both the über-liberal Ted Turner and the ultra-conservative Rupert Murdoch can build media empires; and the brilliant (quack?) utopian, Dr John Harvey Kellogg, can change the breakfast habits of an entire nation. In fact, effectual logic makes no assumptions whatsoever about who the effectuator is. In other words, an effectual logic enables artifacts to work *even if* general assumptions about human behavior do not hold. It is this notion of 'even if' that holds the key to effectual economics.

9.4 THE METHODOLOGY OF EFFECTUAL ECONOMICS

In *Die Philosophie des Als Ob*, Hans Vaihinger (1900) proposed that human beings should willingly accept falsehoods or fictions so that they can live

peacefully in an irrational world. Vaihinger sought to build bridges between Kantian philosophy and a pragmatist view through his notion of ‘as-if’ assumptions about the world. Without such assumptions, he argued, we could not develop useful science or ethics or other enterprises that allow us to survive and live well in the universe. Consider, for example, the statement, ‘Water seeks its own level’. Water, of course, does not have conscious intention to ‘seek’ anything. Yet, modeling water ‘as if’ it seeks its own level allows us to predict its behavior without having to first understand that pressure depends only on density and depth and not on surface area. In this way, ‘as-if’ assumptions allow science to progress and engineering to work even when knowledge is incomplete.

In a characteristically brilliant essay, ‘The Methodology of Positive Economics’, Milton Friedman (1966) used the spirit of Vaihinger’s as-if philosophy to argue against critics of positive (or scientific) economics. If we retrace his arguments and list the characteristics he outlined for a positive economics in parallel with key elements of an effectual logic, we can outline the beginnings of an effectual economics. See Table 9.1 for a summary of the analysis to follow.

Friedman starts with Keynes’s definition of a positive science as the study of what is rather than what ought to be. Positive economics, therefore, seeks to establish facts or stable empirical relationships, such as, ‘Substantial increase in the quantity of money within a relatively short

Table 9.1 Step-by-step comparison of a positive economics with an effectual one

	Positive economics	Effectual economics
Study of . . .	What is	What can be
Type of science	Social science	Science of the artificial
Epistemological focus	Objective	Intersubjective
Assumptions about consequences	Predictable	Unpredictable
Assumptions about human behavior	<i>As-if</i>	<i>Even-if</i>
Ultimate goal	Hypotheses that yield testable predictions	Design principles for making human artifacts
Why we need the goal	To prescribe policy	To design new worlds
Normative stance	Claims to tell us what we ought to do	Denies our reasons for <i>not</i> acting upon possibilities. Cannot claim to prescribe particular actions

period is accompanied by a substantial increase in prices' (Friedman, 1966: 11). An effectual economics would examine what can be – given what is, seeking to establish viable courses of action that may or may not lead to value creation for the people and communities involved. The various solutions to the SUV problem I listed earlier are examples of what an effectual economics makes possible. In sum, while positive economics sees economics as a social science, effectual economics would be a science of the artificial, as discussed in Chapter 7.

Next, Friedman moves to establish the value-neutral stance of positive economics and argues for its objectivity as follows:

Positive economics is in principle independent of any particular ethical position or normative judgments. As Keynes says, it deals with 'what is,' not with 'what ought to be.' Its task is to provide a system of generalizations that can be used to make correct predictions about the consequences of any change in circumstances. Its performance is to be judged by the precision, scope, and conformity with experience of the predictions it yields. In short, positive economics is, or can be, an 'objective' science, in precisely the same sense as any of the physical sciences. (Friedman, 1966: 4)

Effectual economics, too, would begin without any particular ethical position or normative outlook. But its overall stance is likely to be *inter-subjective* rather than *objective*. Effectuation does not seek to make correct predictions. Instead, it seeks to design a world while taking the value judgments of its stakeholders as constraints at every step of the design process. William McDonough's collaboration with Michael Braungart to produce the 'cradle-to-cradle' manifesto is a case in point (McDonough and Braungart, 2002). McDonough was an architect in the service of capitalists indifferent to the environment; Braungart was one of the founders of Greenpeace. The design manifesto that resulted, which embodies both their values, seeks radically to rearrange capitalists' views of environmental issues and environmentalists' views of capitalism.

In aiming for objectivity in positive economics, Friedman is not indifferent to the special difficulties the human element introduces. But he does not see this as a reason to doubt the possibility of objectivity or as a wedge issue to separate out a *social* as opposed to a *physical* science. In this his position is very close to that of a pragmatist who understands the indeterminacy at the heart of the physical sciences, which also is ultimately the nemesis for formal logics and the cause of openness in natural languages, as Wittgenstein pointed out. Friedman alludes to this in a footnote.

The main thrust of Friedman's defense of positive economics is that it is not enough to argue that assumptions of a theory are false, as critics of

positive economics do. It is also necessary to provide alternate ways to generate testable predictions of a competing theory.

As we have seen, criticism of this type is largely beside the point unless supplemented by evidence that a hypothesis differing in one or another of these respects from the theory being criticized yields better predictions for as wide a range of phenomena. Yet most such criticism is not so supplemented; it is based almost entirely on supposedly directly perceived discrepancies between the 'assumptions' and the 'real world.' (Friedman, 1966: 31)

Ergo, in the absence of viable alternatives, as-if assumptions are an appropriate way of generating useful hypotheses. Only then can we *do* science at all. Otherwise, either we will be perpetually paralyzed in deciding what to do, or our decisions will be completely arbitrary. In the final analysis, Friedman is very clear on the purpose of a positive economics:

The ultimate goal of a positive science is the development of a 'theory' or, 'hypothesis' that yields valid and meaningful (i.e., not truistic) predictions about phenomena not yet observed . . . (ibid.: 7)

Economics as a positive science is a body of tentatively accepted generalizations about economic phenomena that can be used to predict the consequences of changes in circumstances. (ibid.: 39)

He is also very clear about why we need such predictions:

The conclusions of positive economics seem to be, and are, immediately relevant to important normative problems, to questions of what ought to be done and how any given goal can be attained. (Ibid.: 4)

What he does not touch upon is this: what do we do in those circumstances when we are unable to make meaningful predictions? The following exposition of an even-if approach to doing economics is an attempt to tackle that question. I shall argue not only that an even-if approach is consistent with an as-if approach, but that, in fact, even-if generalizes as-if.

9.5 EVEN-IF ASSUMPTIONS AND THE METHODOLOGY OF EFFECTUAL ECONOMICS

9.5.1 Even-If Assumptions About Consequences

One ideal for an explanatory and predictive model is that it should provide a series of verifiable statements of the form:

B if A

For example, statements such as: ‘(Competitive) equilibrium allocations are Pareto efficient if agents act as price takers and markets are complete’.

As Friedman argued, it often suffices to work with a more pragmatic model:

B as if A

This is a pragmatic approach because it assumes that what matters are the consequents, B (the ‘effects’), and not the antecedents, A (the ‘causes’). As long as the as-if causes do the job just as well as the ‘real’ causes, there is no reason for debate. To put it slightly differently, ‘B as if A’ says that *even if* A were not actually true, it would still be suitable (for reasons other than verisimilitude) to explain B. Since as-if statements depends on even-if claims, it is worth considering what such claims entail.

Consider the statement:

Even if most firms fail, most entrepreneurs don’t fail.⁵

Then we’re really making two statements about the world:

1. If most firms don’t fail, then (of course) most entrepreneurs don’t fail, that is, ‘if not-A, then B’.
2. But supposing most firms fail, then most entrepreneurs still wouldn’t fail, that is, ‘if A, then still B’.

In the context of classical logic (non-relevance logic), this would collapse vacuously to the claim that most entrepreneurs don’t fail:

if (not-A OR A), then B \equiv if **true**, then B \equiv B

Logically, therefore, it would seem that there is no need for even-if clauses since their antecedents are eliminable. This erroneous conclusion comes from using classical logic in which:

A OR not-A \equiv **true**

Or, equivalently, a logic in which double-negation elimination holds:

A \equiv not-(not-A)

In relevance logic, double-negation elimination typically does not hold. So just because (1) and (2) are separately true does not imply that together they entail a vacuous implication. To assume that they do so is to implicitly assume that entailment is merely material implication.⁶

This detour explains why as-if theorizing is not, as its detractors have sometimes argued, a knack for holding fast to erroneous assumptions in the face of reality. It can be seen as a sophisticated side-stepping of the inadequacies of the material conditional 'if A, then B'.

Such side-stepping is one of the key benefits of even-if reasoning, and suggests that we try to replace or generalize statements of the form:

B as if A

with statements of the form

B even if not-A

For example, an even-if version of an economic model with agents who act as if they maximize utility could introduce utility maximization profiles (similar to risk profiles, say) and derive the original model as a special case. From a neoclassical perspective, the task of even-if thinking in economics is to replace 'hard' assumptions with distributions over sets of possible assumptions.

The violation of the double-negative elimination rule ($\text{not}(\text{not-A}) \rightarrow A$) is, to put it self-referentially, not unimportant. It may help explain why negative evidence seems to have so little impact on entrepreneurial decision making. To say that an artifact is X (or a situation is X) is not to say it is not-X. For example, to say that the Internet is a catalogue differs from saying it is not a not-catalogue. Now, suppose we agree that an encyclopedia is one type of not-catalogue. More transparently, to say that the internet is a catalogue differs from saying that is not an encyclopedia. Most importantly, evidence that the internet is a catalogue does not constitute evidence that the internet is not an encyclopedia.⁷

Why is this important? It says that the presence of evidence for X is not evidence for the absence of not-X. Suppose an entrepreneur has lots of good reasons (R) why he/she should work for a big company. But none of those reasons may be particularly relevant for why the entrepreneur should not start his/her own company. An entrepreneur when asked might simply say,

Even if all these reasons R, I will still start my own company.

The entrepreneur is not saying that the reasons are irrelevant; indeed the entrepreneur's conclusion is based on a logic of relevance.

Take, for example, the plunge decision of the entrepreneur who is leaving a well-paying job to start her own company. She could hypothesize to herself, ‘If I start my own venture, I will be a successful entrepreneur – something I have always wanted’. But if we take a ‘positive’ approach to the hypothesis, the data will almost always be against her taking the plunge. And as scientists studying the subject, we will have to conclude that she will take the plunge only if she suffers from overconfidence bias or is innately risk-loving. But entrepreneurs routinely make the decision on the basis of the negative formulation of the hypothesis: ‘If I take the plunge, I may or may not become a successful entrepreneur; but if I do *not* take the plunge, I will *not* become a successful entrepreneur’. This is the same point I belabored in Chapter 5, when I argued that in an effectual universe, the calculable opportunity costs of *not* doing something outweigh the incalculable opportunity costs of doing it.

At the heart of the effectual worldview is a challenge to the logical assumption of double-negation elimination – that is, that the negative of a negative equals a positive. This same challenge lies at the heart of Goodman’s grue paradox and, as mentioned earlier, in the three kinds of indeterminacy that Friedman talked about in his footnote. Overcoming this challenge requires what James would call a *salto mortale*: the mortal leap into action upon the world, even if we cannot clearly predict the positive consequences. An effectual logic helps make that leap in a reasoned way and helps develop design principles for a world in which such leaps do not destroy individual initiative or communal well-being. At least, that would be the ultimate goal of an effectual economics.

Examples of even-if arguments about consequences

Scholars have long argued that freedom is important *because* it leads to prosperity and/or equity in society. But to me, it seems preferable to make even-if arguments for freedom such as those made by Barrett and Sen. They understand that if we had to rely exclusively on empirical evidence from positive science to take action in that direction, we might have to wait a very long time. But if we look at the evidence for the negative form of the argument, the conclusion is inescapable. As Barrett puts it: ‘The best argument for freedom is the horror of the world without it’ (Barrett, 1978: 197).

In terms of designing a society, then, their arguments take the following form: even if we are not quite sure that freedom leads to ‘the good life’, however defined, we should continually strive to design a freer world – a world in which there is real choice and real hope. Our task then is to design in the face of many types of uncertainty, including uncertainties about what we ourselves want or will want, and what others might want – now or later – and the new challenges and even failures we might face in our striving together.

We can make even-if arguments in other cases such as the separation of church and state. Separation of church and state is a good design principle even if we cannot predict with great certainty that it will lead to a more tolerant society that lasts over time. The evidence is clearer that states *not* guided by separation of church and state are *not* exemplars of religious freedom, nor can they claim to lasting and equitable circumstances for the majority of their citizenry.

Similarly, an effectual logic brims over with even-if design principles that guide entrepreneurial action. Even if you do not have enough resources, you can start a venture using affordable loss. Even if the market does not exist, you can build firms that create value with an adequate number of self-selected stakeholders. Even if you do not quite know not what you want, you can act to develop valuable goals. Even if the firms you have started have failed, you can be a successful entrepreneur. And so on. These are not mere matters of faith or belief or perception; these are effectual *hypotheses* to be reified or falsified through action upon the world and interaction with other people.

‘Designing for freedom’ has the ring of an oxymoron. And rightly so. The design principles an effectual logic comes up with are not prescriptions for how human beings ought to behave or how societies ought to be constructed. Effectual logic can at best churn out new possibilities for how human beings can do things in the world, given the world as it is and given constraints due to a variety of stakeholders who may or may not want a variety of things at different times. In other words, an effectual economics can never tell us what we ought to do. On the basis of even-if assumptions about consequences, it can only deny our reasons for not doing the things we believe and dream we can do. In fact, an effectual logic would deny the very necessity of normative approaches to designing human artifacts and insist on intersubjective interactions between self-selected stakeholders and the commitments they willingly make as the primary driver of our designs. An effectual economics, therefore, builds on even-if assumptions about human behavior to bring to light what can be done.

9.5.2 Even-if Assumptions About Human Behavior

The scientific method seeks to understand and harness nature. And the entrepreneurial method, as I argued in the previous chapter, seeks to unleash human nature, but what constitutes human nature and what assumptions can we make about it? Some pervasive assumptions about human behavior in positive economics include risk aversion, opportunism and well-ordered preferences.

There are vast bodies of literature on each of these. But the verdict of empirical work suggests that such assumptions may be misleading. Instead

of reviewing the work myself, I shall cite but one or two authorities in each case. My arguments will rest on the fact that the scholars I cite have spent large swathes of their academic lives understanding these behavioral assumptions. Take, for example, Paul Slovic's address to the 102nd Annual Convention of the American Psychological Association, where he summarized over two decades of research that shows that people construct their preferences in the process of elicitation:

The meaning of preference and the status of value may be illuminated by this well-known exchange between three baseball umpires. 'I call them as I see them,' said the first. 'I call them as they are,' claimed the second. The third disagreed. 'They ain't nothing till I call them,' argues the third. (Slovic, 1995: 364)

I have already mentioned in several places the confounding results from the risk-propensity literature. Entrepreneurs appear to be all over the spectrum; two recent meta-analyses of the literature point in opposite directions (Miner and Raju, 2004; Stewart and Roth, 2001). Opportunism does not fare all that better. See Rabin (1998) for a comprehensive review. As Coase (1976) shows, even Adam Smith acknowledged the complex variations in human behavior and took them into account in formulating his thesis about the invisible hand. For example, the depth of Smith's understanding reflects most of what we now know empirically about self-interest:

1. People are not solely or even massively self-interested; nor are they entirely altruistic.
2. The same person may be altruistic at certain times and opportunistic at others (robber barons such as Andrew Carnegie).
3. People who are predominantly opportunistic in one domain may be concurrently altruistic in others (The Godfather).

One reason for this pattern of results could be, as Thompson (1998) has suggested, that social selection mechanisms favored by evolution have enabled human beings to become fairly astute in recognizing and acting upon cues for individual versus collectivistic behavior:

Because selection has sometimes favored individualistic and at other times collectivist behavior, the human species has evolved not only the capacity for both kinds of action but probably also a complex cognitive device for figuring out in a given situation which kind of action, collective or individualistic, is likely to produce the best genetic outcome. (Thompson, 1998: 305)

Thompson's argument might be more widely applicable. What we know about human genetics suggests a curious pattern of variation. In one sense

we are more alike than unlike each other – with all geographic, historical, ethnic and cultural variations factored in, we are truly a single species still. Yet we are also extraordinarily different from one another. For example, within a relatively unmixed and genetically homogeneous aboriginal population, we can find more than 84 per cent of all possible human variation (Lewontin, 1972). This curious pattern is mirrored in populations of human artifacts as well. For example, a series of industry studies by Griliches and his colleagues finds persistent heterogeneity too large to be explained by sampling error and/or reasonable dispersion of α at the individual level – so much so that they have to conclude that ‘the simple production function must be seriously misspecified’ (Mairesse and Griliches, 1990). They capture the nature of this heterogeneity in firm populations in an evocative sentence: ‘There is a sense in which different bakeries are as much different from each other, as a steel industry is from the machinery industry’ (Griliches and Mairesse, 1995).

In sum, unpredictability in human behavior may arise out of three characteristics:⁸

- *Heterogeneity* People are very different from one another. However we might classify human beings into categories, variation *within* categories will be as likely and significant as variation *between* categories.
- *Lability* People change over time. Not only behavior, but traits and preferences change.
- *Contextuality* People play multiple roles. For example, a person may be highly risk averse to jumping off airplanes, but might nonchalantly short-sell stocks in a bull market.

Note that I deliberately did not use the concept of ‘situation’ here because this term has been used to confound two separate concepts: context as a setting for behavior – that is, a domain within which a particular behavior occurs; and context as a determinant of behavior – that is, a set of circumstances that causes people to behave in a particular way. Like genetics or childhood experiences, ‘situation’ may explain why and how people differ from each other, or change over time, or take on multiple roles. Neither trait-dependence nor situation-dependence, by itself, is a characteristic of human behavior, although they may explain how and why one person’s behavior differs from another’s, or how and why someone changes over time, or how and why individuals play multiple roles. Whereas situation-dependence and free choice are each necessary but insufficient explanations for human behavior requiring an as-if approach to theory building, the above three characteristics are sufficient but

unnecessary assumptions about human behavior for building even-if theories.

As mentioned earlier, the ultimate goal of effectual economics is not to predict behavior, but to develop design principles for fabricating human artifacts. Such principles will use even-if assumptions instead of as-if assumptions about human behavior. In other words, a theory based on assumptions of opportunism prescribes that we design a management control system as if people would try to take advantage of loopholes. An effectual logic, in contrast, would point out equivalent advantages in trading off Type I and Type II errors in the opposite direction, and highlight the possibility of designing management control processes that leverage intelligent altruism even if not all people behave altruistically at all times and under all circumstances. Similarly, instead of expecting and instructing potential entrepreneurs to be risk takers or caution them against being over-confident, a course in effectual entrepreneurship would teach them how they could become entrepreneurs even if they were at different points on the risk propensity spectrum with their propensities changing over time and across domains.

9.6 PUTTING ‘EVEN IF’ TO WORK IN THE CONSTRUCTION OF MARKETS

Even-if assumptions are more general than as-if ones. Even-if assumptions are unnecessary but sufficient conditions for action. They work even if consequences are unpredictable and behavior is heterogeneous, labile and contextual. But within the subset of circumstances when consequences are predictable, traits and preferences are stable, and behavior is consistent, we can decide and act on as-if assumptions. As-if assumptions are also particularly useful for a variety of *post hoc* analyses through which we can learn about what did and did not work. In converting those lessons into designs for the future, however, an effectual logic urges us not to leave our designs to some ‘objective’ technique, however rigorously developed or successfully implemented in the past. Instead, it takes into account the compelling arguments that Wittgenstein, Heidegger and other philosophers made against Russell’s proclamation quoted at the beginning of this chapter. No amount of positive science or careful econometrics or oracular expertise can completely replace the continual conversation and plodding struggle of human judgment and intersubjective interactions that go into the fabrication of artifacts such as new markets. My arguments about the necessity for effectual economics is rather evocatively represented in a painting by the Dutch artist M.C. Escher (reproduced in Figure 9.1).



Source: M.C. Escher's 'Three Spheres II' © 2006 The M.C. Escher Company-Holland. All rights reserved www.mcescher.com

Figure 9.1 Spheres II

Putting the entrepreneur front and center in economics will entail a view of markets as artifacts rather than as an automatic Walrasian auction or as a competitive landscape to be explored and conquered.

- The opaque globe on the right is like an economics with no role for the entrepreneur – a world of perfect information, well-ordered preferences and exogenous environments.
- The globe on the left is more like the economics of technological change and recent theorizing in entrepreneurship, where incomplete information and opportunity discovery play crucial parts in market processes.
- The central globe represents the possibility offered by effectual economics in which human action takes center stage in the face of an unpredictable future, goal ambiguity and environmental isotropy.

Obviously, I am not the first to argue that there is nothing automatic or even spontaneous about market mechanisms, and that making markets, like fabricating any intersubjective human artifact, requires real work. The roots of this contention go back to Adam Smith himself. He recognized the effort and activity required at the intersubjective level, including the necessity to bargain, negotiate and persuade:

Different genius is not the foundation of this disposition to barter which is the cause of the division of labour. The real foundation of it is that principle to persuade which so much prevails in human nature . . . We ought then to mainly cultivate the power to persuasion, and indeed we do so without intending it. Since the whole life is spent in the exercise of it, a ready method of bargaining with each other must undoubtedly be attained. (Smith, 1896, p. 171)

Olson and Kahkonen (2000) similarly argue for the artificial nature of markets:

The fourth primitive of economic thought – and of most lay thinking on economics – is so elemental and natural that it is usually not even stated explicitly or introduced as an axiom in formal theorizing. It is the half-conscious assumption that markets are natural entities that emerge spontaneously, not artificial contrivances or creatures of governments. (Olson and Kahkonen, 2000: 1–2)

There exists a popular vision of ‘the market’ as an inexorable force efficiently allocating scarce resources among the able and the needy. This image of the market as an automaton tirelessly aggregating individual choices into economic welfare is at best a mythical and unattainable ideal.

It is not a coincidence that one of our most brilliant formal economists, Kenneth Arrow, proved the impossibility of rigorous social choice (Arrow, 1951); and one of our most philosophically minded, Amartya Sen, drew upon the pragmatist Davidson to argue for constructive approaches to overcome that impossibility through intersubjective interactions (Sen, 1999). An effectual economics could provide a useful toolbox to devise and calibrate design principles in building these constructive approaches.

Such approaches will rest on a pragmatist philosophy of markets (as opposed to ‘the market’) as instruments for individuals striving to live well:

The market economy, as an aggregation, neither maximizes nor minimizes anything. It simply allows participants to pursue that which they value, subject to the preferences and endowments of others, and within the constraints of general ‘rules of the game’ that allow, and provide incentives for, individuals to try out new ways of doing things. (Buchanan and Vanberg, 1991: 181)

An effectual logic shows how some of the creative churn entailed by the heterogeneous, labile and contextual nature of human behavior may be combined with the inherent unpredictability of yet-to-be-made worlds to stitch together a variety of markets from the bottom up. The effectual economy itself then resembles a patchwork quilt of markets that embody a variety of human purposes that may every once in a while be torn apart and radically redesigned through the entrepreneurial method.

NOTES

1. However, Simon urged me in several conversations to ignore that dictum and instead suggested that I look to the history and psychology of science, i.e. what real scientists actually *do*, rather than what philosophers think they ought to do. I would hazard a guess that in a career spanning over six decades and as many disciplines, there were at least two Simons, if not as dramatically opposed to each other as were the two Wittgensteins.
2. An idealistic form of utilitarianism that takes the view that an agent is equally responsible for the intended consequences of an act and its unintended but foreseen consequences.
3. From personal communication.
4. There is a widely known story, largely apocryphal, that Omidyar started eBay so his girlfriend Pam could trade Pez dispensers. The details of the actual startup of the firm, AuctionWeb, that later became eBay, are even more conducive to an effectual explanation than the Pez dispenser story would lead us to believe. See Cohen (2003) for a history.
5. It is not important whether this is true or false (we’re only interested in the logical aspects of the claim).
6. It may be possible to interpret ‘even if A, B’ modally, that is, interpret A as an unnecessary but possible condition for B. There are other arguments, however, which suggest that relevance logic is the natural framework in which to discuss the semantics of even-if clauses. As for the idea that entailment is captured by material implication, Anderson’s comment is worth noting: ‘I hope we can all agree that such a supposition should really occasion nothing more than general laughter’ (Anderson, 1967: 349).

7. See Friedemann (1996) for a fascinating discussion of the relationship between Hempel's raven paradox and the double elimination rule.
8. The assumptions of positive economics are meant to facilitate formalization. At first glance it might appear that I am rejecting formal approaches to building effectual models. I am not. In fact, in Chapter 13, I point to new developments in probability and logic that might enable formal modeling of effectual approaches.

10. Markets in human hope

The topic for this chapter is a puzzle that I have struggled with. The puzzle is this: why can't we buy futures contracts in Rwandan prosperity? Or options in environmental conservation in Brazil? Or equity in the emancipation of Afghan women? If we want to participate in the upside potential of biotechnology, we can buy Genzyme stock or shares in a biotech mutual fund with a couple of clicks of the mouse. But if we want to participate in the upside potential of literacy in the Congo delta, or even youth development in South Central Los Angeles, we have to research obscure charities, mail out checks, maybe fill out tax exemption forms, then cross our fingers and hope that our money will be put to some good use. We have no way of analysing and selecting among competing models, monitoring investments, trading them for liquidity, or cashing in on positive results.

Are there reasons for believing that investments in biotechnology can be profitable but investments in the eradication of human misery cannot? In fact, the latter are not even categorized as *investments* but are deemed a matter for *charity*, something to be financed through sacrifice without expectation of a positive return. The irrepressibly cornucopian economist Julian Simon spent his life arguing that human beings are the ultimate resource (Simon, J, 1981). His data run deep and long, and his analyses are compellingly careful and explicit. Yet it is easier to invest in the future of pork bellies than in the future of human potential. It is not my contention that biotechnology or pork bellies are less valuable than the eradication of illiteracy or poverty. Rather, my position is that since all economic value ultimately derives from human beings, investments in the eradication of human misery should be both viable and valuable.

This chapter takes as its starting point the premise that *all* markets are ultimately markets in human hope and that the idea of separating out some products and services for the for-profit sector and others for the non-profit or social sector is both unnecessary and inane. A more general form of this premise, called 'the separation thesis', was formulated by Freeman (1994) and is well known in the field of business ethics (Freeman, 1994; Wicks, 1996).

Arguments about the efficacy of markets as opposed to governments and hierarchies in value creation are well known and prolific. So is the literature on market failures. Political and economic philosophers have worked on the

problem from the perspective of aggregate welfare. I examine the same concern from a different perspective, namely, that of individuals – call them philanthropists or investors or reformers or (social) entrepreneurs – interested in doing something about improving the human condition. Furthermore, I limit my exploration to solutions that specifically evoke an effectual logic.

The exposition of effectual logic in the previous chapters implicitly assumes that the new ventures created are for profit and that the new markets are markets for economic goods. Yet there is nothing in the logic that prevents its application to non-profit ventures and markets for social goods and services. In this chapter, not only do I look at the role of effectuation in the latter case, but also question the necessity to separate the two in the first place.

10.1 THE CASE FOR MARKETS IN HUMAN HOPE

In general, markets compete with other mechanisms, such as firms, governments and non-profit ventures, for organizing our economic, political and social lives. Recent history – or at least the dominant rhetoric of economic policy around the world – suggests that markets may have an edge over those other mechanisms. It is easy to give in to an ideological fervor about so-called ‘free markets’, especially after the fall of the Berlin Wall. Therefore, in analysing the relative advantages of market and non-market mechanisms, I shall begin by sorting through three important critiques of a simplistic preference for markets.

10.1.1 Market Failures

It is an article of faith in US public policy and with most welfare economists that government intervention or other forms of non-market mechanisms should be used to mitigate inefficiencies caused by market failures (Zerbe and McCurdy, 1999). Market failure refers to the failure of market mechanisms either to sustain socially desirable activities or to stop or prevent socially undesirable activities (Bator, 1958). Markets may fail for a variety of reasons, but perhaps the best studied is the notion of an externality.

Externalities may be positive or negative. Positive externalities refer to benefits that are created, but not entirely appropriable, by those who produce those benefits. Negative externalities consist in costs that are created by, but not recoverable from, those who produce those costs. Environmental pollution is a textbook example of a negative externality, just as education exemplifies a positive one. The argument goes that

government intervention is necessary to force polluters to bear the costs because they have an incentive to pass the costs on to those in their immediate geographic vicinity rather than to their final customers. Similarly, since it is not always possible to charge students for the full benefits they reap from education, there is an incentive for underinvestment in education if left to private enterprise.

It is important to note, however, that private mechanisms have been developed to deal with externalities. Although the jury may still be out on how well these are actually working (Hahn, 1989), attempts to invent new private mechanisms continue. Consider, for instance, emissions trading in the case of pollution (Foster and Hahn, 1995) and human capital contracts in the case of education (Palacios, 2004).

Externalities are one of the main reasons given for why non-market mechanisms dominate the so-called 'social' sector (Dees, 1994). Yet, as Dees observes, recent trends point to a growing number of social ventures, including for-profit ventures, that provide many of the services in human hope. But externalities are not the only reason for turning to non-market mechanisms. Wolf (1979), for example, lists four causes of market failures:

1. Externalities and public goods.
2. Increasing returns: markets for products and services that are subject to increasing returns and decreasing marginal costs are likely to become monopolies that result in price inefficiencies and dampened incentives for innovation. The software market, which has been dominated by Microsoft, is a case in point.
3. Market imperfections: this refers to deviations in the microstructure of certain markets from a 'perfectly' competitive market. Examples of imperfect markets include monopolies, oligopolies, etc.
4. Distributional inequity: libertarian economists have long argued that distributional equity is not a necessary or even a desirable outcome of market mechanisms (Von Mises, 1949). All the same, to the extent that we consider an equitable distribution of income in a society a public good, philanthropy and government intervention become necessary to redistribute wealth; free markets alone will not get the job done.

After explaining each of the four sources of market failure above, Wolf goes on to argue that non-market mechanisms are subject to similar failures caused by the following:

1. Internalities and private goals: lack of direct performance standards and metrics in non-market mechanisms lead to a variety of internal interpretations that obscure or obviate an organization's original goals.

In particular, Wolf lists the following internalities: budget growth (more is better); technological advances (new and complex is better); information acquisition and control (knowing what others do not know is better).

2. Redundant and rising costs: because of internalities and the lack of external competition, there may not be consistent efforts to reduce costs in a non-market setting.
3. Derived externalities: non-market solutions may sometimes have unanticipated side effects for which it may not be possible to hold them accountable. Wolf provides several examples of these, such as strained relations with France and England over the Concorde resulting from the Environmental Protection Agency's restrictions on noise pollution.
4. Distributional inequity: non-market solutions may themselves create new distributional inequities.

The net result of Wolf's analysis is that both market and non-market mechanisms are imperfect. Therefore market failures are only a necessary and not a sufficient condition for non-market solutions. Wolf not only advocates more and detailed implementation analyses of existing policies, but also emphasizes the need for creative mechanisms that incorporate the best of both market and non-market solutions.

Mancur Olson (1996) comes at the problem of market versus non-market solutions from a completely different angle. His main argument is that markets are artifacts fabricated by the government. In other words, government intervention is necessary to create markets in the first place.

10.1.2 The Artificial Nature of Markets

Olson studied a variety of countries (including formerly communist and developing countries) to understand the reasons for differences in economic prosperity. Integrating numerous studies of large migrations, particularly those from poorer nations to richer ones, Olson argued for 'the overwhelming importance of institutions and economic policies' (Olson, 1996: 19). His argument was based on the fact that the history of immigration provides natural experiments to isolate the effects of availability and quality of factors of production from those of economic policies on economic growth and prosperity. Study after study confirmed his conclusion that, by all counts, the most important explanation lay in differences in public policies and institutions:

[t]he large differences in per capita income across countries cannot be explained by differences in access to the world's stock of productive knowledge or to its

capital markets, by differences in the ratio of population to land or natural resources, or by differences in the quality of marketable human capital or personal culture. Albeit at a high level of aggregation, this eliminates each of the factors of production as possible explanations of most of the international differences in per capita income. The only remaining plausible explanation is that the great differences in the wealth of nations are mainly due to differences in the quality of their institutions and economic policies. (Olson, 1996: 19)

At first glance, Olson's conclusions contradict Wolf's. The idea that non-market mechanisms in general and government intervention in particular are both unnecessary and insufficient appears completely antithetical to the inescapable and exclusive importance of public policies in explaining economic growth and prosperity. The key to overcoming the contradiction lies in the *details* of differences in institutions and economic policies identified by Olson's studies.

In a one-day seminar at Carnegie-Mellon University, just three months before he passed away, Olson talked at length about his notion of 'market-augmenting' as opposed to 'market-hindering' governments:

I would argue that the single most important determinant of whether entrepreneurship that's everywhere and markets that are everywhere – the single most important determinant of whether they lead to success and a prosperous economy – is whether there is market augmenting government. Now it's customary, as we know, to think of markets and government as alternatives. Should the role of the market or the role of the government be larger? And of course we know there are times when governments and markets are alternatives when decisions are made that something should be done by the government or privatized and done by the market and of course that happens. But I would argue that the governments of the successful economies are net market augmenting. That is to say they generate, account for, explain more markets than they replace or repress. Governments are a source of markets in a big way when economies work well. (Sarasvathy, 2000: 6)

Yet it is not very clear in Olson's writings *how* governments come to be market-augmenting. One explanation could be the sheer march of history, especially in an increasingly globalized system with widespread communication networks. Another could be political and social movements that militate against and coordinate regulatory reforms such as the titling of untitled assets, and the enforcement of contracts (De Soto, 2000). But with our budding understanding of the effectual logic that expert entrepreneurs use to bring stakeholders together to transform realities, it is tempting to ask if we are not overlooking an important means for creating market-augmenting institutions in the world.

In other words, what is the rationale for restricting an effectual logic to for-profit enterprises? Instead, why not redefine 'markets' to include *all*

markets in human hope and ‘entrepreneurs’ to include *all* entrepreneurs, including those inside governments (public entrepreneurs) and in the citizen sector (social entrepreneurs)? Such a reframing immediately challenges the separation between ‘economic’ and ‘non-economic’ problems, or ‘for-profit’ and ‘non-profit’ or the more trendy ‘social’ ventures. All endeavors to live well in the world, be they in the arts, or sports, or philosophy, or philanthropy, may be opened to and benefit from market-augmenting approaches.

Before we delve deeper into this possibility, however, we need to deal with one last objection to the blind preference for markets over other types of mechanisms, and this one comes from closer to home. It is based on Simon’s (1991) essay on the ubiquity and priority of hierarchical organizations and his admonishment of ‘new institutional economics’ for its overreliance on armchair theorizing rather than on stubborn facts on the ground.

10.1.3 Ubiquity and Priority of Hierarchical Organizations

New institutional economics builds on and extends neoclassical economics to include a vital role for institutions defined as:

the humanly devised constraints that structure human interaction. They are made up of formal constraints (rules, laws, constitutions), informal constraints (norms of behavior, conventions, and self-imposed codes of conduct), and their enforcement characteristics. (North, 1994:)

The intellectual ancestry of new institutional economics can be traced back to Coase’s (1937) analysis of why firms exist. As Simon correctly points out, that very question is an issue only in a world where markets are center stage. In a world where market transactions are the default option, strange questions naturally arise, such as: why are most people employees and not traders or independent contractors? What determines the boundaries between firms and markets? What motivates employees to work for the firm’s profit? And so on.

Simon’s chief indictment of theorizing within this frame is that squaring the theory with observed empirical facts requires making even more arduous assumptions about human behavior than those made by neoclassical economics – the assumption of opportunism (self-interest seeking with guile) being a prime example. He proposes a simpler approach – namely, that we live primarily in an *organizational* rather than a *market* economy – and bases his thesis on more parsimonious assumptions such as docility (the fact that human beings like to give and take advice). For Simon, the empirical facts are unmistakable. Organizations are the norm. It is market mechanisms that need explanation, because they are so few and far between, and the more complex are relatively recent in history. That is why he was very comfortable

with my thesis that in an effectual universe, markets are artifacts fabricated by human beings. It takes *work* to create markets. An example of such work is the process through which entrepreneurs seek to build enduring organizations and, intentionally or not, end up building new markets.

Simon ended his critique with a call for building macroeconomics from the ground up, from microfoundations that are forged ‘in the teeth of stubborn facts’, as William James used to say. In particular, he suggested replacing ‘the primacy of profit as the enforcer of organizational efficiency’ with the actual variety of reasons why people work together in organizations that work well (Simon, 1991). Chief among these reasons would be the ability to shape and implement organizational goals that matter to internal stakeholders as much as they matter to the external market; the human necessity for and enjoyment of being part of a larger organizational identity; as well as financial and other types of rewards.

History offers ample evidence of the ubiquity of organizational processes – that is, individuals coming together to organize production, public works, trade and even governments themselves. Their efforts do not always reveal the boundaries between pecuniary and non-pecuniary motives or activities, and they often involve what Olson called ‘a logic of collective action’. This striving to achieve a variety of organizational goals through collective action ends up fabricating the institutions we see in the world, including that superhero (anti-hero?) of institutions that we call ‘the market’. It would be a serious pity, therefore, if we were to surrender this most useful of instruments we have devised to a false separation between for-profit business and non-profit social objectives.

I have thus far examined a variety of objections to a giddy advocacy of markets in the sense of a *laissez-faire* – let’s just leave it to free markets and all will be as well as it can possibly be – attitude. Working through those objections has left me with a profound sense of the actual power of this awkward artifact that embodies both the individual craving for freedom and the genuine possibility of the good life writ large for the community. But my real case for markets in human hope rests not on the painstaking theorizing, steadfast empirics, or continuing conversations by our best scholars. It rests, as good advocates know, on a compelling story that is told just as the jurors leave to deliberate the verdict. The story I am about to tell juxtaposes two entrepreneurs whose lives may seem parallel in many aspects, yet they split apart at one crucial point that makes all the difference.

10.1.4 Addams and Yunus – Case Studies in Human Hope

By any definition except one that requires financial profits as the only objective function, Jane Addams would qualify as an entrepreneur. She lived

from 1860 to 1935, most of her life without the right to vote. At age 27, with her friend Ellen Starr, she founded a settlement house called Hull House in an underprivileged area of Chicago. The concept of a settlement house involved educated university graduates moving into poor areas of the city and organizing clubs, recreation and educational programs for people in the neighborhood. The distinguishing characteristic of the settlement was its ability to deliver services without employing professional social workers or welfare agency staff who were often judgmental and punitive in the way they related to poor people. Hull House was just the beginning of Addams's entrepreneurial career. According to one biography:

Miss Addams and Miss Starr made speeches about the needs of the neighborhood, raised money, convinced young women of well-to-do families to help, took care of children, nursed the sick, listened to outpourings from troubled people. By its second year of existence, Hull-House was host to two thousand people every week. There were kindergarten classes in the morning, club meetings for older children in the afternoon, and for adults in the evening more clubs or courses in what became virtually a night school. The first facility added to Hull-House was an art gallery, the second a public kitchen; then came a coffee house, a gymnasium, a swimming pool, a cooperative boarding club for girls, a book bindery, an art studio, a music school, a drama group, a circulating library, an employment bureau, a labor museum. (Haberman, 1972: 133)

Winning the Nobel Peace Prize was perhaps the least of Addams's achievements. Curti (1961) explains how, even before the work of James and Dewey reinforced her radical empiricism, Addams became something of a pragmatist, 'determined to test ideas and values about life in the laboratory of actual life'. She had the temerity to quarrel with the idealistic stance of the founding fathers of America, 'because their idealism is of the type that is afraid of experience' (Addams, 1905: 426). Addams's idealism was utterly intrepid when it came to experience. At all times, she delighted in discovering the depth and breadth of human potential. In her own words:

Life in the Settlement discovers above all what has been called 'the extraordinary pliability of human nature', and it seems impossible to set any bounds to the moral capabilities which might unfold under ideal civic and educational conditions . . .

The Settlement casts aside none of those things which cultivated men have come to consider reasonable and goodly, but it insists that those belong as well to that great body of people who, because of toilsome and underpaid labor, are unable to procure them for themselves. Added to this is a profound conviction that the common stock of intellectual enjoyment should not be difficult of access because of the economic position of him who would approach it, that those 'best results of civilization' upon which depend the finer and freer aspects of living

must be incorporated into our common life and have free mobility through all elements of society if we would have our democracy endure. (Addams, 1998: 289)

Addams was also a writer – at once poetic and profound in her prose. In *The Long Road of Women's Memory*, she listens to the brutalized and marginalized lives of countless women and reports their narratives with pity-free clarity and unfailing hope (Addams, 1916).¹ In the actual voices of these wretched women, she never fails to hear the possible notes of a better world. Her sociological imagination rivals the best efforts of any social philosopher, including our own Studs Terkel. Here is but a tiny taste of it:

These indomitable souls are but three out of many, whom I might instance to prove that those who are handicapped in the race for life's goods, sometimes play a magnificent trick upon the jade, life herself, by ceasing to know whether or not they possess any of her tawdry goods and chattels. (Addams, 1998: 118)

Let us leave Addams for the moment at her desk, writing those words that reach across time to catch us by the throat and come to a cold day in November 2004 in Charlottesville, Virginia, where we hear a lecture by Mohammed Yunus, the founder of Grameen Bank. He works with the poorest of the poor, mostly women, in rural Bangladesh. In a recent visit to the Darden School as a keynote speaker at the Ruffin Lecture Series in Business Ethics, he described the poor people he worked with as 'Bonsai people'. He argued that, even if they are illiterate and have been socially oppressed for centuries, they are the same as any redwood in the forest. They appear ridiculously small and wretched, for they have been planted in tiny pots with poor soil. When the pots are broken and they are brought out into the sunlight, they, and especially their children, appear to grow taller, stronger and smarter, and their natural proclivities emerge.

In many ways, Yunus's story parallels that of Addams. Addams recounts her visit to London after a prolonged period of illness that ended in her giving up a career in medicine, and she tells of her first major encounter with poverty, which left her with 'an uneradicable impression of the wretchedness of East London, and also saw for the first time . . . the overcrowded quarters of a great city at midnight'. She describes the crowds of poor gathered at a Saturday night auction of cheap food on Mile End Road:

Their pale faces were dominated by that most unlovely of human expressions, the cunning and shrewdness of the bargain-hunter who starves if he cannot make a successful trade, and yet the final impression was not of ragged, tawdry clothing nor of pinched and sallow faces, but of myriads of hands,

empty, pathetic, nerveless and workworn, showing white in the uncertain light of the street, and clutching forward for food which was already unfit to eat.

Perhaps nothing is so fraught with significance as the human hand, this oldest tool with which man has dug his way from savagery, and with which he is constantly groping forward. I have never since been able to see a number of hands held upward, even when they are moving rhythmically in a calisthenic exercise, or when they belong to a class of chubby children who wave them in eager response to a teacher's query, without a certain revival of this memory, a clutching at the heart reminiscent of the despair and resentments which seized me then. (Addams, 1998: 49–50)

Yunus, too, described an encounter with extreme poverty. After earning a doctorate in economics at Vanderbilt University in the USA, Yunus returned home to head the Rural Economics Program at the University of Chittagong in Bangladesh, after the country became independent in 1971. In his volunteer efforts during periodic riots and famines, he began noticing that people suffered tremendous hardships for lack of tiny sums of capital. He decided to make a list of such sufferers in a village. His first list consisted of 42 people, and the amount required to alleviate their immediate misery amounted to \$27! When he inquired with local banks, he found that they could not lend monies to these villagers, because they were considered to be 'unbankable'.

Yunus then borrowed money on his own credit – his 'bankability' being calculated at the princely sum of \$500 – and began the microcredit operation that has grown into Grameen Bank (GB). As of July 2004, GB had 3.7 million borrowers, 96 per cent of whom were women. With 1267 branches, GB provides services in 46 000 villages, covering more than 68 per cent of all the villages in Bangladesh.

Yunus's talk at Darden was titled 'We Can Create a Poverty-Free World'. An audience consisting primarily of academics, warm and comfortable in a large auditorium with an excellent acoustic system, waited to hear his case. Yunus began in his quiet voice by opting out of a theoretical or normative lecture, choosing instead simply to tell the GB story through his personal experiences. Step by step, each small detail challenged dominant economic and management precepts and incessantly reinforced the stark efficacy of *investing* in the human potential rather than *alleviating* human misery. By the time Yunus finished, we were left helplessly convinced, at least for the moment, that it was not only *practically* possible in a small corner of one continent, but more generally feasible, to create a poverty-free world – on *theoretically* sound principles, no less (more on that later).

I had finished the first draft of this chapter the night before Yunus's talk. So, when the speech ended on a thunder of applause that did not quite know how to dissipate, I ran up the stairs behind Yunus as he hurried out

to the limo that was waiting to take him to the airport. I asked him if I could ride with him, and he assented without fuss or surprise. During the ride, I told him about the book, requested and received permission to use material from his talk, and expressed how moved I was by his story. Inevitably, I also asked him what I could do to help. With a surprising flash of alarm on his face, he quickly turned to me and responded, ‘Please do not send me any money. GB does not need funds.’

And here is the pivotal difference between Addams and Yunus. In my research into Addams’s biography and bibliography, I came across the following letter dated 8 December 1932:

My dear Mrs. Hart,

May we ask you to share our efforts this month to supply actual human needs as well as Christmas cheer and good-will to our hard-pressed neighbors?

For forty three years we have never altogether failed them at Christmas time and we should be more than grateful in this year of their many discouragements.

With all the good wishes of the season, I am faithfully,

Jane Addams

There has to be something wrong with the picture of a woman capable of understanding the magnificent tricks human beings play ‘upon the jade, life herself’, sitting down to write the above letter 43 years into her enterprise. And there has to be something right with the spontaneous reflex of Yunus trying to deter me from writing him a check. And *that* is my case for markets in human hope.

In other words, Addams formulated the problem as one of charity, worthy of wealth redistribution; Yunus structures the same problem as investments, capable of wealth creation. The focus of Addams’s efforts was human needs; that of Yunus lies in human hope and human potential. Both approaches seek to help people better themselves and their situations, but while Addams’s primary tool is that of social service, Yunus invents, transforms, leverages and constructs markets.

10.2 THE CASE FOR AN EFFECTUAL LOGIC IN BUILDING MARKETS IN HUMAN HOPE

The following is a list of principles that Yunus outlined in his talk. Although I have compiled them directly from the talk, most of them are also attested to at various places on the GB website and in papers and books that have been written on GB. The principles are very compatible with an effectual logic. In fact, Yunus mentioned that he developed them in the actual process of building the bank – as particular problems arose, or

decisions needed to be made, or new markets began to open up. In hindsight, he said, it's clear that they invert virtually every principle of conventional banking practice.

10.2.1 Principles and Practices Embedded in the GB Experience

Start with a problem and not with a solution

Yunus explained that with the founding of GB, he had given up the bird's-eye view of academics and had instead adopted the worm's-eye view: 'I may not see the larger context and all the theoretical issues any more. But I see the little problems; and I see them clearly and in great detail'. As a result, his solutions are precise and uniquely adapted to each situation. GB's website insists that 'a credit system must be based on a survey of the social background rather than on a pre-established banking technique'. The solutions are *designed*, leveraging locality and contingency to the fullest.

Lend to the poorest of the poor

Conventional banks do not lend to the poor; the poor are GB's primary stakeholder-customers. And it is not merely the high-potential poor who constitute GB's market. GB welcomes and works with any and all, including the poorest of the poor. Consider, for example, GB's recently instituted 'beggar program'. Yunus pointed out that they began with generational beggars – those whose families had been beggars for three or more generations. These beggars would go door to door and ask for small quantities of rice. GB found that they make good salespeople, so GB gave them the option of trading goods in return for the rice. One case was particularly telling – the case of beggars without legs. But, as Yunus pointed out, these beggars already had 'strategic locations' – or else they could not have survived on begging. It turned out that they had good sales potential too. Both beggar programs have achieved considerable success as investments.

Lend without collateral

The bulk of GB's investments are made on the basis of affordable loss. GB's loan amounts are often so minuscule that it is not cost-effective to write and enforce contracts. This is one of the main reasons conventional banks consider poor borrowers 'unbankable'. Yet, as other microfinance operations have also shown, the world's poorest are often the most creditworthy: repayment rates for GB are close to 100 per cent. On its website, GB announces another reversal of conventional banking theory – namely, the transformation of the vicious circle of 'low income, low saving and low investment' into a virtuous circle of 'low income, injection of credit, investment, more income, more savings, more investment, more income'.

The bank comes to the customer; customers do not go to the bank

Since GB lends primarily to women (also a reversal of banking practices, which tend to be biased against women), it has had to deal with what are normally seen as insurmountable cultural problems. In Bangladesh, as in other cultures, women not only earned no income – many had literally never touched money. Turning them into active participants in new markets in credit and empowering them to seek economic self-sufficiency involves going door to door – listening, understanding, learning and building trust by walking in their shoes and even living in their shadows. Yunus described how this has been accomplished – not by the wholesale rejection of their cultural values (for example, through lectures on the rights of women) but through little practices that require them to take small steps (such as requesting the husband's permission for the wife to handle small amounts of currency). Each particular step involves minimal investments (monetary and otherwise) that individuals can decide whether they can 'afford to lose', as it were. And so, to use James's words, by piling 'grain on grain of willful choice like a very miser', new habits were formed, leading eventually to new 'fields of action'.

GB *invests* in people without whom neither the venture nor the economy can fly. It takes its stakeholders' problems and needs as design constraints, and not as obstacles in the development of markets and economies. Yunus mentioned illiteracy as a case in point. He said that when designing computers and other appliances, modern engineers do not give up on blind customers; instead, they develop Braille keyboards or voice-activated mechanisms. Similarly, he suggested using technology and other means to design *around* illiteracy. 'Just because she is illiterate does not mean she is not intelligent', he repeated. He mentioned several instances of how the world had underestimated the potential of these 'Bonsai' women to create value and wealth: 'It is so easy to throw away human potential, unvalued and unused!' – a lament that Julian Simon would have heartily endorsed.

Think in terms of non-loss ventures, not non-profit ventures

This principle represents the ultimate reversal apparent in GB's principles. Toward the end of the speech, Yunus called for two things: capital markets for social causes (to be examined a little later in this chapter) and non-loss ventures as opposed to non-profit ventures. Non-loss ventures will not have profit maximization as their objective function; instead, they will have *not making a loss* as a constraint on their (social) objective function.

In both of these suggestions, Yunus appeared to be giving in to the separation thesis, which advocates a separate capital market for social causes and a new type of firm to replace the non-profit firm. In all humility, I would like to propose, instead, that *all* ventures should take either non-loss

or profit as a strong constraint and be free to develop their own particular objective functions – be they to become market leaders in gel-ink pens or first movers in sustainable energy solutions, build a better wind-up toy or a poverty-free world. And *all* ventures should be tradable in equity markets everywhere. This brings us back full circle to the question I posed at the beginning of the chapter: why can't we buy futures contracts in Rwandan prosperity?

10.2.2 Advantages of Equity Markets

What Mohammed Yunus has actually created is an *equity* market in human hope, with debt and cash components. GB not only lends little sums, and offers new products and services for self-employed entrepreneurs, but also builds ownership: 94 per cent of the bank is owned by its borrowers.

What does equity buy us? It is well known in financial economics that ownership consists in *residual* claims. In other words, after all contractual obligations are fulfilled by the firm, the remaining benefits and responsibilities belong to the owners of the firm (Fama and Jensen, 1983). In general, reasonably predictable claims can in principle be written down in formal or complete contracts. Ownership becomes relevant only in those situations when contractual provisions do not specify what is to be done.

Take the case of a child. Through careful planning, you can virtually raise your child entirely through other people: nannies, day-care providers, teachers, doctors, friends' parents. But whenever something unexpected happens and the chain of care is broken – say there is a severe snowstorm and school is canceled – the responsibility for caring for the child reverts to you.²

In other words, contractual claims are causal claims on the future; they derive their value from the predictable aspects of the future. Equity provides effectual claims and derives its value from the unpredictability of the future. Borrowing money with a preset repayment schedule allows GB members to invest in the predictable parts of their individual futures. Investing their savings and becoming members of the bank allows them to participate in the upside potential of *all* members – including new ventures they cannot even predict or imagine *ex ante*. Of course, it also involves them in downside risks that may be equally unpredictable. But if we are persuaded by even-if arguments about human behavior and its consequences, then the gains to novelty are likely to outweigh the losses due to behavioral failures. Neither upside nor downside can be predicted, but downside can be contained through techniques of non-predictive control implemented through peer pressure and the negotiated commitments of self-selected stakeholders.

To paraphrase the well-known conceptualization by Hirschman (1970), large equity markets such as the New York Stock Exchange give us not only a *voice* – a say in which projects to invest in – but also *exit* and *loyalty* – the opportunity to buy and sell our equity. I shall not review the vast scholarship on capital markets, nor will I take positions on extant theories or unresolved questions in finance. Instead, I outline below four key advantages of well-developed equity markets. My perspective is that of the lay individual investor, not the professional trader or the financial economist. And my purpose is to make a case for actually *building* equity markets in those products and services for human hope that are currently excluded from stock exchanges.

Competing models

Public equity markets allow me systematically to explore, analyse and evaluate a variety of competing models in particular industries or technologies. Similarly, I would like to be able to choose between competing models for eradicating poverty, illiteracy and other human ills. Even within a single model, different entrepreneurs may execute differently or come up with entirely different innovations. Hayek (1984) argued that competition fosters innovation and increases the dimensionality of the commodity space. Publicly traded equity in human hope will similarly foster quick imitation and diffusion of valuable innovations as well as induce the creation of new models to solve social problems.

Monitoring

Public equity markets also help me monitor my investments. Through quarterly reports using standardized formats and metrics, I am able to keep track of my investments in terms of management changes, new strategic initiatives, financial performance, and so on. I would like to be able to do that with my investments in Afghan women or inner city education, but for now I have to rely on the occasional newsletter or solicitation for more donations. Furthermore, it is virtually impossible to compare how my money is performing in the various initiatives to which I have made contributions. I would also like to be able to turn on CNBC to hear about the latest techniques in dealing with human misery and listen to entrepreneurs make their pitches as to why their models are better, faster, or cheaper in solving these problems. I could then go to my computer and, with a few clicks of the mouse, invest in the entrepreneur or model that I believe would work better to solve the problem I wish to focus on.

Liquidity

Once I have given money to a particular charity, it simply vanishes. Stock market bubbles notwithstanding, I enjoy the ability to liquidate my

investments when I need the cash and invest again when I have some idle funds in the bank. I understand and am delighted by the fact that Mohammed Yunus did not want my money. But I would like to fund another Yunus in another venture, maybe on another continent or in another domain of human hope – someone who has the drive and energy and mother wit to put my money to work in the world. And by having his stock publicly traded, I need not depend on him to return my money when I do need to use it. I can merely sell my equity to another investor like me.

Upside potential

Of course, it is possible that non-loss ventures will fail just as for-profit ventures do. That is already true of non-profit and social ventures today. Again, stock market bubbles notwithstanding, a case could be made that it is harder to lose money in the stock market than in philanthropic investments. Yet billions of dollars are given every year to social causes without expectation of financial return. An upside potential, therefore, need not be a necessary condition for investments in non-loss ventures. But that does not mean an upside potential is *unlikely*. In fact, how can it possibly be profitable to invest in new technologies if it is not profitable to invest in human beings? It is clear that some ventures have potential while others do not. That is true in every technology, industry and human activity. But what is the reason for classifying some types of human hope as marketable and others not?

The catch seems to be in the unstated assumption that only some human beings have potential. Others are merely a drain on the system – or as Sen (2000) puts it, seeing people as victims or patients rather than as active agents. But the empirical evidence, whether it comes from economists such as Julian Simon and Mancur Olson, or entrepreneurs such as the subjects in my study and others quoted throughout this book, stands counter to this assumption. Relying on the alternate assumption that all economic value ultimately derives from human beings, *even if* some human beings may at times be a burden on others, I make the following claims:

- *The markets-for-all thesis* It is feasible and valuable to open up public equity markets to all ventures without creating separations between for-profit, non-profit and ‘social’ ventures.
- *The non-loss thesis* It is possible to design all ventures, involving every facet of human hope, with a strong non-loss constraint.
- *The human hope = economic value thesis* Over the long run, open equity markets and non-loss ventures will lead to increased economic income and growth for all ventures and their stakeholders, including the ones outside these markets.

These theses, as I have mentioned in Chapter 9, are not merely hypotheses to be tested after the fact but calls for action. They are design principles to be reified and falsified through action upon the world.

In several places in the book, I have emphasized the pluralistic nature of an effectual universe. In fact, the book is filled with arguments for pluralism. My claims above, therefore, may strike a jarring note. It may appear that I am advocating a single organizational form for all ventures. I hasten to disabuse any semblance of such an interpretation. My arguments for markets in human hope are very much in line with the discipline required truly to embrace pluralism. Since pluralism permits multiple solutions while at the same time rejecting the idea that all solutions are equally good, it requires us to engage actively in conversations about what works well for what purposes – and it is that task that I am attempting here.

Instead of advocating a single organizational form for generating profits – that of an investor-owned enterprise, I am urging that we disconnect choice of organizational form from the profit motive. Therefore my claims are compatible not only with existing variety in organizational forms but also with an increased pace of organizational innovations in the future. By arbitrarily chucking enterprises into two mutually exclusive bins called ‘for-profit’ and ‘non-profit’, we are seriously misspecifying the problem. Even worse, we are forcing all problems in human hope to be defined in terms of profit – for or against. By making profit a design constraint instead (which it is de facto whether we explicitly acknowledge it or not), we are free to invent any type of organizational form we want and tackle any problem in human misery we choose. Expert entrepreneurs have done that in venture after venture in every sphere of human activity.

10.2.3 The Closing Argument

Specifically, I am arguing that there is no economic necessity to divide the world into for-profit and non-profit ventures. There may be historical, cultural and psychological reasons. Freeman (2001), for example, talks about the ‘business sucks’ story in various academic and societal circles. But there simply is no *economic* reason for the separation thesis. Let me give a concrete example. Those of us who have served both on for-profit and non-profit boards have surely experienced what I am about to describe.

Assume you are an alien visitor to the planet.³ Assume, further, that you have no conceptualization of this thing called ‘profit’. You are invited to attend something called a ‘board meeting’ of a ‘for-profit’ company. You walk into a plush room with tasteful furniture, heavy cloth napkins and sparkling glasses. The people in the room are well dressed and polite, but a little reserved in their interactions with one another. You observe them

making decisions about raising and allocating funds for a variety of projects. In making those decisions, they worry a lot about target segments, customer value propositions, revenue models, payback ratios, exit strategies, and other minutiae related to the projects. The worries are almost always laced with the excitement of adding to something called 'the bottom line'. They are relaxed and expansive as they leave the room; there is a certain amount of patting on the backs and hearty laughs, and perhaps the faintest whiff of good cigars. You leave the room thinking they are a warmer bunch than you thought; and surely, all must be well in a world in which decisions are made in such fashion by such people.

Next, you attend another board meeting, this time at a non-profit organization. The room is not as plush, but there is a homely welcome in the cookies and drinks laid out on the side table. The people in the room are perhaps slightly more disheveled than those in the first room, but very warm and solicitous. Again, you observe them making decisions about raising and allocating funds for a variety of projects. You notice they are more excited about the projects, more earnest and passionate in their rhetoric. But they spend a lot more time worrying about how to raise funds than discussing the details of the projects. There seems to be less doubt about the projects themselves but quite a bit of concern about whether they can raise 'enough' money. As they leave the room, they talk about completely different things, as though they are relieved the meeting is over and eager to move on to anything other than fund-raising. You leave the room faintly worried that all may not be right with the world, even though you've just met such good people who seem to care about it.

You have a sleepless night ahead of you. How do you make sense of the fact that the people in the first room were not quite sure about the projects they were investing in but did not worry all that much about the money needed to fund them; and the people in the second room, who were so sure about their projects, seemed worried and even slightly defeated by the prospect of raising the required funds? To make the puzzle even more confusing, some of the same people were in both rooms! And some of the projects were in the exact same domains!

What is the rationale for telling people in one room they do not have to worry about the world, 'Just make sure you make money', and telling those in the other room their job is to worry about the world, but 'You cannot *make* any money. You can only get it from those who make it in that other room – either by begging them for it or by taxing them'? The only thing that makes this absurd system work is the people who flit back and forth between both rooms.

Again, I insist there is no rationale – certainly no *economic* rationale – for this separation thesis. Both involve raising as well as deploying funds.

Both make investments in creating value. Both need to worry about the details of how those investments will be put to use. And both can and should lead to increased *economic* as well as social value. And both should have access to capital and equity markets. Both can benefit by a focus on ‘making’ money – a creative stance – rather than on ‘raising’ it – a stance of dependence. But how might we remodel this house divided and open up all markets to every kind of human hope?

10.3 MAKING EQUITY MARKETS IN HUMAN HOPE

As I stressed in Chapter 9, an effectual logic neither prescribes nor forecasts. But it can generate useful fictions that can be embodied in actual courses of action for making new markets. In that spirit, I present three short pieces that suggest how equity markets in human hope can come to be. Each piece starts with an actual non-profit venture. Each of the three ventures is an interesting entrepreneurial story in itself.

The first one is the International Institute of Modern Letters (IIML), a non-profit organization that helps foster the literary arts. It is an offshoot of a venture developed by Richard Wiley, director of University of Nevada at Las Vegas’s creative writing program; Wole Soyinka, Nigerian dramatist, poet, essayist and theater director, and winner of the 1986 Nobel Prize for Literature; and Glenn Schaeffer, president of Mandalay Resort Group, a company that owns a host of luxury resorts across the country, including five on the Las Vegas strip: Circus Circus, Excalibur, Luxor, Mandalay Bay and Monte Carlo. Schaeffer had attended the Iowa Writers’ Workshop with Wiley but had then gone on to a successful career in business. Soyinka had co-founded the International Parliament of Writers with Salman Rushdie, which created a Cities of Asylum program for oppressed writers, following an increase in assassinations of Algerian writers. The original venture made Las Vegas the first City of Asylum in the USA and has since spun off several initiatives, including the IIML.

The second venture is Ithaca Hours, a local currency spawned from the enterprising mind of Paul Glover, graphics designer and community economist in Ithaca, NY. Glover developed the community scrip, a system of printed notes that allows people to exchange their labor without resorting to cash or direct barter. Since 1991, over \$100 000 worth of Ithaca Hours (10 000 Hours valued at \$10 each) have been issued in five denominations. Glover estimates that 1600 participants, including 300 businesses, have both earned and spent Hours, with a total value of trade in Hours of about \$2 million to \$3 million. The currency appears to be widely accepted

within Tompkins county, although the amount is small compared with other payments methods. According to critics of the system, there are at least two snags, economically speaking. First, the Hour is pegged to the US dollar (\$10 per Hour) and, secondly, it is subject to the Internal Revenue Service.

The agenda for the enterprise is not only economic. Its stated social objective is 'to gain control of the social and environmental effects of commerce'. Initiatives include commemorative Hours issued to honor local people and the environment – for example, the first paper money in the USA to honor an African American. Ten per cent of all Hours issued are awarded as grants to community organizations. The enterprise now also operates a non-profit health-security system called The Ithaca Health Fund and WISE, the Whole Ithaca Stock Exchange.

The third and final case is the non-profit social venture Ashoka. Founded by Bill Drayton in 1980, Ashoka's mission is to develop the profession of social entrepreneurship around the world. Ashoka searches the world for social entrepreneurs, defined as 'extraordinary individuals with unprecedented ideas for change in their communities'. Ashoka identifies and invests in them through stipends (called Ashoka fellowships) and professional services that allow them to focus full time on their ideas for leading social change in education and youth development, health care, environment, human rights, access to technology, and economic development. Ashoka has invested in more than 1500 Ashoka Fellows in 53 countries. Investments currently total approximately \$17 million per year.

The following three sections contain moments from fictionalized future histories of these three ventures.

10.3.1 A New Game in Vegas

May 2010, Las Vegas The Mandalay Bay offers its customers a new 'pool'. The flexie lists odds on IIML writers winning the Nobel Prize in Literature. Wole Soyinka storms into Glenn Schaeffer's office and threatens to resign, sue, and wring Schaeffer's neck.

Schaeffer calmly leans back in his chair and explains to Soyinka that the proceeds will go to IIML; that as the number of exile writers from around the world is increasing, with the increasing literacy rates in China and India combined with widespread internet access in both countries and fundamentalist backlash from religious groups in India and hard-line communists in China, IIML needs viable new sources of funding. His own personal philanthropy only goes so far, and he is getting too old for the endless fundraising events. Soyinka, revolutionary of thought and strong poet, withdraws. For now. Still fuming.

July 4, 2010, Las Vegas Soyinka issues a press release seeking private placement of a stock portfolio consisting of seven literary ‘unknowns’, all recent graduates of UNLV’s creative writing class. Each has been incorporated as an LLC and comes with a full prospectus about future earnings and risk ratings by leading literary and movie critics. Schaeffer storms into Soyinka’s office. Soyinka calmly explains to him the difference between a horse in the race and its owner in the stalls. It is Schaeffer’s turn to back down.

July 15, 2010 Headlines in the *Las Vegas Business Press*: ‘The Soyinka placement is vastly oversubscribed’. There is a ferocious ‘pit’ at the Mandalay lobby – Syl Cheney-Coker, poet in exile from Sierra Leone and first writer-in-residence at IIML, has broken all records for a first-day opening in any non-high-tech IPO in the history of the US stock markets.

Of course, the Mandalay was not a stock market and Cheney-Coker was not even on the Soyinka portfolio. Well, maybe not just yet.

10.3.2 Himalayan Hours

2020, Kathmandu, Nepal Gargi Neeti is walking along the clear, cold, bustling streets of Kathmandu. She walks fast, hoping to clear her mind, shake off doubts, and prepare for battle.

She tells herself that it has all been worthwhile; that *she* is worthwhile. Had she not managed to get to Cornell? Had she not had the perversity to refuse that mouth-watering (obscene?) offer from KPMG? The courage to return home – no, *charge* home – and start Himalayan Hours? The temerity to print money!

And how hard it had been. Working with Paul Glover on his Ithaca Hours project, in safe, law-abiding Ithaca, US of A, it had seemed easy, the basic principles obvious.

But the effects of Himalayan Hours have been very different in Nepal. She admitted she made mistakes, maybe pushed too hard, been too noisy, lectured rather than listened. The pro-Hindutva government – proxy government, really – and the royal family had not taken kindly to her enterprise. Maybe she’d stepped on too many toes with her vociferous support for women’s rights, freedom of the press, and universal web access.

She shrugged – I must be who I am, the gesture seemed to say. She wasn’t the cause of the problem. The trouble was that she’d succeeded beyond her wildest dreams. Himalayan Hours was blazingly successful. After 2018, she was practically the only solvent game in town. Virtually nobody accepted the rupee anymore. Her Hours were doing well. Too well.

Himalayan Hours actually traded higher, ridiculously higher, on the ‘black’ market than its official price pegged to the US dollar. She had to find

a way to bleach the black market or else all her efforts would be in vain. She had spent the last 18 months trying to understand the problem. And now she had to act.

She knew what she had to do. She had to rejoin the world, issue real shares in Himalayan Hours on a real stock exchange. SENSEX? NYSE? Her pace steadied.

She turned. The words of a long-dead philosopher gave her comfort: *Salto mortale*.

10.3.3 Doing Lunch in DC

Item in Washington City Paper – August 30, 2008. *Doing lunch to do away with world hunger?* Bill Drayton, founder of Ashoka, hosted four of his favorite Ashoka Fellows from around the world for lunch at Vidalia yesterday. He introduced them to a team of leading business professionals: an accountant, an investment banker, a financial economist and a corporate lawyer. Their task: to develop new metrics, financial instruments and regulatory devices; to come up with a feasible plan to make an IPO on the social ventures founded by the entrepreneurs on an existing stock exchange, if possible. They could even build a new exchange, if necessary. Members of the Schwab Foundation and the Salvation Army, and George Soros were invited as participant-observers.

10.4 CONCLUSION

I opened this chapter with a puzzle: why can't we buy futures contracts in Rwandan prosperity? One answer could be that there are valid economic reasons for market failure in that example. I have made a case against such reasons. I have, moreover, argued that free markets are not 'free' in the sense of spontaneous emergence, that they need to be paid for in imagination and work; indeed that they are artifacts resulting from human action. My aim has not been to show how to build markets in human hope. Rather it is an invitation to those more qualified to take up the task. New capital markets and new investment instruments are continually invented (Shiller, 1998). Take, for example, new markets in organic produce and in pollution trading. My exploration suggests that the task I have outlined is doable and worth doing.

I am, however, fortunate to be part of a budding network of self-selected colleagues who want to attempt this task. The first venture under consideration is an equity market in non-governmental organizations (NGOs). According to the Institute for International Economics, the USA spent

approximately \$9.4 billion in international aid in 2000, of which \$2 billion was set aside for development assistance. A third of this was administered by NGOs. Another \$1 billion from Europe is also managed by international NGOs. Besides these, there are thousands of local NGOs, some of whom have billions of dollars under management. Take, for example, the American Association of Retired Persons (AARP). In 1996 it had \$3.8 billion in gross revenues for supplemental health insurance and nine mutual funds with \$13.7 billion in assets. One estimate of the total number of NGOs puts it at over 37 500. These large NGOs are sophisticated enough to make the transition into financial markets and allow their investors to participate in the advantages of equity markets.

Like all new ventures, it is not quite clear what this market in NGOs will look like or whether it will work. But proceeding effectually – building upon extant metrics such as social return on investment (SROI) and transforming financial instruments such as futures contracts – we hope to understand the stable structures of markets in human hope by actually building one.

In sum, I have tried to make two arguments in this chapter: first, ‘market’ mechanisms are useful and powerful instruments for organizing human efforts in value creation; in fact, they are too useful and powerful to be abdicated to a false separation between for-profit and non-profit ventures. It is possible that distrust of market mechanisms will outlive capitalism itself. But it would be a pity not to provide markets as live options to those who choose to work with them on the social side of the illusory separation between business and society.

Secondly, equity markets can and should be opened up to *all* ventures, both to the entrepreneurs who found and run the ventures and the investors who fund them. Especially for those of us who seek to *invest* in human potential, beyond the immediate callings of humanitarian crises and the temporary alleviation of human misery, my aim has been to urge the provision of a vibrant marketplace where value is created and exchanged on a daily basis.

Both arguments flow naturally from and are consistent with an effectual logic.

NOTES

1. Addams’s critics sometimes accuse her of sentimentality – Theodore Roosevelt is said to have called her ‘poor bleeding Jane’ and ‘a progressive mouse’. In my opinion, her prose speaks for itself. It underscores the fact that Roosevelt’s comments derive from his politics and not his true judgment.
2. I do not mean to imply that babies are matters of possession. The analogy actually goes the other way. For most entrepreneurs, ‘ownership’ in their ventures is almost as precious

as a caring parent's emotional stake in and unconditional responsibility for his or her children. Entrepreneurs often refer to their enterprise as 'my baby'.

3. I apologize for my complete unoriginality in using this device that Simon (1991) and Schaefer (1999) have used so effectively in the past.

PART IV

The way ahead

11. Teaching effectuation

I have taught effectuation in a variety of formats ranging from one-day executive education to 7-week, 10-week and 15-week graduate and undergraduate courses. An 8-page introduction to effectuation is also being used in over a dozen business schools around the world; and I have shared my experiences with some of those who have used it. In this chapter I outline some experiences and challenges of teaching effectuation.

11.1 TWO TOOLBOXES

I do not teach effectuation as the only way to do entrepreneurship. Instead the course is built around the notion of two toolboxes – causal and effectual – and how to use them effectively in the creation of new ventures. Like most entrepreneurship instructors, I use case studies, in-class exercises, interactive lectures, video clips from entrepreneurs and others, and guest speakers from the entrepreneurial community including early-stage lawyers, angels, accountants, brand consultants etc. One difference is that all my course materials, pedagogical devices and in-class discussions revolve more around the students' own new ventures than on general theories or best practices. This is the first and most important challenge of teaching effectuation.

11.1.1 Who You Are, What You Know and Whom You Know Versus Opportunities

I insist students start with a new-venture idea the very first (or latest, by the second) day of class and that they immediately start building it. This is a startling and uncomfortable notion for most students. A discussion on making versus finding an opportunity is imperative at this point. One way to organize that discussion is to have students provide examples of great entrepreneurship and then ask them to think through the earliest stages of those ventures. A wide range of examples can include Starbucks, Staples, Apple, Ben and Jerry's, eBay, and even Sears and General Electric.

One pedagogical challenge here is to get the students' trust and 'buy-in' to commit quickly to a new venture project. I usually have to reassure them

in many ways about not waiting for the truly novel or the compellingly high-potential new-venture idea. I have found it useful to show them video clips from successful entrepreneurs urging them to not wait for the extraordinary but to go for the mundane that they find doable and personally worth doing. Take, for example, the following quote from Robert Reiss, founder of R&R, a company that brought games like Trivial Pursuit to the USA:

People think they shouldn't go into business unless they have a blockbuster idea that's going to change the world. It doesn't really work that way. There are few blockbuster new ideas. There are just mundane kinds of ideas. You do something better than someone else. You take an existing thing and you add on to it a new twist. It is just like Scrabble. You take an existing word, you put one letter on it and you get credit for the whole word – your letter plus the whole word. (Harvard Business School, video clip available at <http://www.hbs.edu/entrepreneurs/bobreiss.html>)

11.1.2 0–60 mph

Once students commit to tentative new venture ideas, the course can proceed by examining all decisions and actions both from a causal and an effectual perspective. A useful analogy here is the differences in engineering design in automobiles. The design principles that take you from turning the ignition on to getting to 60 miles per hour is very different from the know-how that ensures a smooth and high-performance drive on freeways. Examples of discussions organized around particular steps include:

- Doing market research versus negotiating effectual commitments
- Bringing the right people on board versus working with self-selected stakeholders
- Obtaining finances requisite for performance projections versus zero resources to market or investing what one can afford to lose
- Targeting the upside versus controlling the downside
- Betting on probabilities versus strategizing on conditioning assumptions
- Avoiding failures versus managing and leveraging them
- How to *become* the successful entrepreneur versus how to *do* entrepreneurship well
- Managing trade-offs versus designing synergies
- Manipulating constraints versus reconstituting objective functions.

It is important to re-emphasize here that the point of exploring contrasting perspectives on these decisions and actions is not to prove one superior to the other, but to learn to understand and use both.

11.2 THE EFFECTUAL NETWORK

The cornerstone of the course content on effectuation is the effectual network. It is a good idea to introduce Figure 5.1 early in the course, discuss it in the context of particular class projects and/or cases during the course and go over it in outline again toward the end of the course. I have used Figure 5.1 to analyse a variety of case histories including Koehn's (1997) study of Josiah Wedgwood and the RealNetworks case mentioned in Chapter 3.

Static elements of effectuation can be introduced either through a class exercise involving the building of U-Haul or other ventures, or by students reading the introductory paper on effectuation and discussing it in class. Detailed principles of effectuation can be discussed through specific case studies as well as through student projects. I have used several case studies published by Harvard. Ruth Owades, for example, is a good case to illustrate the affordable-loss principle, and the Kitty Hawk case illustrates the folly of ignoring self-selected stakeholders in the pursuit of 'right' stakeholders based on predicted target markets.

But for teaching the dynamic model, the example at the heart of the model as specified in Chapter 5 works very well. Something as simple as a blue pen can serve the role of Widget *X*. Thereafter it is a matter of illustrating the negotiation of the initial commitment in class through a series of role-playing exercises. These can be expanded to include the students' own projects, allowing them immediately to apply concepts from the models to the ventures they are involved in building as part of the class deliverable.

The class deliverable, in the spirit of the 'two toolboxes' approach, can either be a business plan (causal) or a log of actual stakeholder commitments combined with business model changes that go with those commitments (effectual). In either case, the course also requires the students to take action steps such as deciding whether and how to incorporate, putting together a board of advisors, designing branding primitives such as name, logo, tentative press kit and elevator pitch, etc. Both causal and effectual deliverables have to worry about resources and stakeholder relationships and react to feedback from a variety of sources including the instructor, peer groups and the local entrepreneurial community.

A few key class discussions involving the effectual network include:

- The plunge decision
- Understanding the difference between ownership and control
- Making, growing and dividing the pie
- Reconciling the two meanings of the good life for a variety of stakeholders
- Opportunism and opportunity costs.

11.3 WHAT EFFECTUATION IS NOT

There are several additional challenges in teaching effectuation in business schools, where most courses emphasize causal decision analyses of one kind or another. Students often confuse effectual action with *not* doing those types of analyses. This hinders their absorbing it as an alternate logic with its own complex techniques and thought processes that need to be developed through practice. So along with working through key concepts in effectuation and contrasting different principles and strategies with causal approaches, it is necessary to address what effectuation is *not*. Even if the issues I discuss below occur very rarely and almost never explicitly, many potential difficulties can be pre-empted by incorporating the following points early on. Reinforcing what effectuation is not as well as what effectuation is helps keep discussions straight.

11.3.1 Effectuation Is Not Another Name for ‘Anything Goes’

Effectuation can sometimes be mistaken for an ‘anything goes’ type of creativity. The analogy here is that of non-evaluative, non-judgmental, undisciplined ‘throwing paint against the wall’ kind of art. I have found business students sometimes have naïve and near-mystical ideas about the creative arts, and assume that effectuation is about that type of unlearnable and perhaps unteachable creativity.

11.3.2 Effectuation Is Not the Easy Way Out

A more insidious interpretation involves using effectuation as an excuse for avoiding number-crunching and systematic logical reasoning of any kind. Usually students who have had a tough time in quantitative courses such as accounting and finance tend to embrace effectuation for the wrong reasons. Thereafter, when they learn they do need to worry about costing and term sheets and cash flows, they may tend to get disillusioned very fast.

11.3.3 Effectuation Is Not Irrational and Intuitive

Some students have so strongly bought into the notion of ‘rationality’ – usually those with some background or training in economics – that they see all techniques that do not readily conform to rational analysis as ‘irrational’ or ‘intuitive’. This sometimes results in a rejection of effectual logics through continual arguments as to why it would be inefficient or risky or downright idiotic. At other times, it leads to a rather indifferent shrugging off of effectuation as a kind of deviation due to cognitive limitations – useful

at times, but mostly a biological rather than a logical approach to good decision-making – something one has to put up with and deal with and work around, until *Homo sapiens* evolves to a more optimal point in history. Emphasizing the ‘logic’ part of effectual logic serves to dissipate this illusion.

11.3.4 Effectuation Is Not Charismatic Leadership

Expert entrepreneurs, especially if they talk to the class in person or through video clips, sometimes come across as highly charismatic leaders, visionaries who are able to see great art where others only see blank canvases. Part of the problem here is that effectuators often describe themselves as and genuinely believe themselves to be visionaries with a flair for discovering opportunities, spotting the right people, and keeping their eyes steadfast on the prize. The key here is to get students to hone in on particular decisions the effectuators made and their reasons for taking the actions they did. When entrepreneurs talk about the specifics of actually starting and running new ventures, the effectual logic may be observed in stark relief. In generalizing from their particular experiences to ‘advice’ for potential entrepreneurs or life lessons of one kind or another, they tend to relapse into the fearless-leader rhetoric. This is not to say that they are not in actual fact charismatic leaders; I merely insist on students getting into the nitty-gritty of how these entrepreneurs came to be the leaders they are. Again, the 0–60 mph phase of entrepreneurial careers is the interesting setting in which to witness effectuation in action.

11.3.5 Effectuation Is Not Passion Before All

A recent twist on charismatic leadership is the über-important role of passion. Passion has become in many ways the most overused word in the MBA vocabulary. And, like any overused word, people imagine it to be whatever they want it to be and then attribute fantastic, almost magical, powers to it. For devotees of passion, then, effectuation is merely an alias for passion, with a few bells and whistles such as affordable loss and self-selected stakeholders. The effectuator’s passion becomes about process and action and people just as the charismatic leader’s passion is about the vision of the enterprise. In some ways this may not be a bad thing to get the student to try an effectual logic. But here again, the ‘logic’ of effectuation needs to be highlighted and reiterated to achieve more useful pedagogy.

11.3.6 Effectuation Is Not Not Being Afraid

Most students, especially in MBA courses, tend to be risk-averse. And they may interpret effectuation to mean the need to take risks, to act without being afraid or neglecting the downside. It is extremely important, in my opinion, to confront this issue through a rather comprehensive discussion of risk, its relationship to value – particularly whether risk is an attribute of what one values or an attribute of the venture opportunity, perceived versus actual risk, the three types of uncertainty that Knight talked about, and the actual risk-reduction techniques embedded in an effectual logic. A non-trivial discussion of entrepreneurial performance, failure management and the effectual processing of probabilities and non-predictive control is also very useful. The information provided in Chapter 6 can form the agenda for class discussion here.

11.3.7 Effectuation Is Not a Bunch of Traits

A difficult challenge that keeps cropping up is the notion that some people are effectual and others are causal. In other words, it is a focus on effectuation as a trait rather than a logic. I try to argue here that there is a traits basis for almost anything. Some people may even be born accountants or marketers or other things. But that does not mean there is not a body of knowledge to be learned in accounting and marketing.

11.3.8 Effectuation Is Not a Recipe for Success

The final hurdle that an instructor has to overcome consists in the oldest of all traps – i.e. that effectuation is a recipe for new-venture success. It is a fact that entrepreneurs, novices and experts alike, do not really want to fail and seriously want to believe that they have found the holy grail, or at least a special compass to lead them to it. I find a good discussion about the performance relationships laid out in Chapter 6, combined with a continual emphasis on making as well as finding holy grails, helps both students and instructors avoid this trap.

11.4 RESEARCH POSSIBILITIES IN TEACHING EFFECTUATION

There is some playfulness to learning a logic that seeks to stand every problem on its head. Students often bring to my class an idea they had been introduced to in another class they had been taking and then try to reframe

it using an effectual logic. I have shared some of these at other places in the book. Here are a few more examples that are worth investigating in future research, particularly through laboratory and field experiments in logical framing.

11.4.1 The Plunge Decision

The reframing of the plunge decision came directly out of my class. Thereafter, I began gathering data on how entrepreneurs actually make that decision, which then led to my beginning to formulate the ideas about *even-if* theories in Chapter 9. MBA students routinely want to know how best to make the plunge into entrepreneurship. Most of them do not plan to start a new venture right out of school. They know that when the time comes, they would have real opportunity costs in terms of a stable salary to contend with. Once during a class discussion on the subject, students pointed out that you could frame the problem in one of two ways: first, as one of giving up X dollars in salary, in which case the burden of proof lies in projections of future returns that have to compensate for the potential loss of income; and, secondly, as a finite investment in terms of time and money with a large and open-ended upside potential that need not be calculated in detail. Add to this the following two facts: (a) the upside potential of a new venture is an opportunity cost in the decision *not* to leave the well-paying job, and (b) there exists a non-zero probability of being able to earn an income comparable to current income should things not work out in the new venture within a precommitted time limit. All of a sudden, the plunge decision looks very different than it did at the beginning of the analysis.

11.4.2 Two Types of Costing

The abstract structure of the plunge decision problem can be translated to almost any type of costing and investment problem. Another student shared with me his experience of starting a new venture that paid for itself through the software services he provided clients, until he designed a new product that needed him to invest in manufacturing facilities. He kept calculating the possible size and growth rate of the market for his product and the realistic levels of market share he could capture. He had a dynamic programming model worked out in such detail that it was a marvel all its own. He would spend hours at a stretch trying to decide whether to go into manufacturing or to outsource it, or altogether pass on the idea, until he realized he did not need all that elaborate calculation. All he needed was a manufacturer of the machinery who would lease it to him on reasonable

terms with a bit of equity thrown in, and a customer or two whose purchases would cover working capital for the first year. He went out to find them and made the decision contingent on their coming on board.

11.4.3 Faces and Wallets

The idea of affordable loss, particularly limited through the induction of self-selected stakeholders, takes both guesswork and actual risk out of new-venture decisions. This is, of course, a rather tall claim yet to be subject to rigorous empirical tests. But there is another element that argues for its potential efficacy. And this was also pointed out to me in class. Resource acquisition is a predominant theme in most entrepreneurship courses. But as a student pithily pointed out, wallets always come with faces – so why not target faces instead of wallets? Luckily faces almost always come with wallets too, especially if we include the ‘who you are, what you know, whom you know’ as part of the resource mix. Targeting resources separately from the actual people involved – i.e. seeing wallets as independent of faces – leads entrepreneurs to underestimate what it takes to maintain and nurture investor relationships. In early-stage ventures, investors are partners and investment relationships cannot usually be kept at arm’s length. This issue is worth investigating. Preliminary forays into the topic have led me to the following set of competing hypotheses:

Hypothesis: If revenue projections and profitability potential drive new-venture creation as the opportunity recognition school of thought claims, then more new-venture failures would occur due to people getting the product, or the technology or the market wrong.

Alternate hypothesis: Instead, if as effectuation suggests, new-venture creation is largely driven by stakeholder relationships, then more new ventures will fail due to partnership problems (relationship failures) of one kind or another than due to problems with lack of resources or product, technology and market factors, or environmental factors – strategic or macroeconomic.

11.4.4 Ownership Issues

The centrality of self-selected stakeholders in effectual entrepreneurship draws special attention to ownership issues in general, and students’ understanding and comfort levels with parting with ownership in particular. Most students come to class with the simplistic notion that more ownership equals more control, and although it is better to have a smaller piece

of a much larger pie than one could make on one's own, giving away equity is a bad thing to be avoided whenever possible.

There are at least two testable theses pertaining to ownership in terms of an effectual logic that matter both to practicing entrepreneurs and future research in entrepreneurship.

First, equity derives its value from unpredictability. The deeper the uncertainty, the more control can be gained over the unpredictable future through stakeholder participation – i.e. through the distribution of equity. The reverse also holds. The wider the ‘buy-in’ of self-selected stakeholders – i.e. the wider the distribution of equity – the more likely that the new venture will open up new markets that could not be predicted *a priori*, and hence the greater the value of the equity in the long run.

Secondly, equity is an option on the uncommitted resources of self-selected stakeholders. It is well known in financial economics that ownership does not equal control. Furthermore, effectuators know that control over outcomes is not the same as control over the new venture; and ownership is not cast in stone. Founders can give away equity as well as purchase it or earn it back. Most stakeholders want control over outcomes and not control over the venture. Effectual entrepreneurs want control over the venture as well as control over outcomes. Effectuators understand how to leverage the desire to control outcomes – i.e. increase the size of one's own slice of the pie, in order to gain and retain control over the venture – i.e. build much larger pies and get to decide what goes into them. To the extent contingencies can be anticipated, there is no need to give out equity – contractual provisions can take care of emergencies. But precisely in those situations of unanticipated contingencies where a pilot is needed in the plane is when the resources of the stakeholders (not merely financial, but identity, knowledge and networks) need to be invoked at will. Equity, in the case of *self-selected* stakeholders, is an unwritten option on these uncommitted resources. Ergo, the larger the variety and number of the *self-selected* stakeholders, the larger the number of unanticipated contingencies that the new venture can leverage into profitable opportunities.

The four topics above are just the beginning of research possibilities that are likely to arise out of teaching effectuation. Because effectuation is in essence a new logical frame that reconstitutes decision problems in the new-venture setting, and the new-venture setting is itself a new frontier in research, I confidently anticipate that many new research issues will surface in the classroom.

12. Research works-in-progress

No new venture is viable without self-selected stakeholders. This chapter is written by three of my earliest research partners. They have influenced my thinking in ways I cannot measure and are engaged in empirical investigations that test and push effectuation beyond anything I might have imagined on my own. Their contribution is effectual in that they go beyond enhancing and growing the ideas in the book; they redefine and transform its possibilities. I include a very brief glimpse of their contribution in the following three sections, the first on effectuation and new markets written by Nicholas Dew, Assistant Professor at the Naval Postgraduate School in Monterey, CA; the second on effectuation and new-venture performance by Stuart Read, Professor at IMD, Switzerland; and the third on effectuation and private equity investing by Robert Wiltbank, Assistant Professor at Willamette University in Salem, OR.

12.1 NICHOLAS DEW ON EFFECTUATION AND NEW MARKETS

How does a market's time come? It's a simple question but one that is not easily answered. We know a lot, mainly from economics, about how markets work once they exist. Once all the relevant variables are in place, we have a plethora of theoretical tools available with which we can analyse the behavior of markets, sometimes with great accuracy. But the truth is that we know a lot less about how markets come to be. One of the key reasons effectuation is an exciting idea is that it helps us answer this important and difficult question. In the next few pages I'm going to describe some of my work in collaboration with Saras and explain why I have come to the conclusion that effectuation is an important weapon in any theoretical arsenal aimed at understanding how a market's time comes.

12.1.1 The Context of my Research: the Evolution of Markets and Industries

Stand back for a moment and consider the big picture of economic, social, cultural, political and organizational change that informs much modern

academic scholarship. Without doubt, as a collective we labor at Darwin's behest: almost universally the disciplines utilize evolutionary ideas. In particular, those of us interested in where new markets and industries come from inhabit a scholarly community in which Darwin's influence is deeply ingrained (Hodgson, 2002). A number of scholars in this community have articulated the necessity for developing rigorous and useful microfoundations for evolutionary approaches to market and industry change, particularly those working in the traditions of evolutionary economics (Dosi, 1997; Loasby, 1999). These scholars contend that there is no theory of entrepreneurial/firm behavior that is consistent with the basic supply-push story of how new markets are created that has been articulated in evolutionary/Schumpeterian economics (for a very accessible account of the state of the art, see Geroski, 2003). Put simply, conventional accounts of entrepreneurial/firm behavior do not mesh well with conventional accounts of industry founding. In particular, we have to reckon with at least two stylized facts.

First, product variation at the birth of markets is large (Geroski, 2003). The basic evolutionary view is that new markets are pushed up from the supply side on the basis of the transformation of existing artifacts, and often on the basis of transforming pieces of emerging technologies into marketable products. Entrepreneurial firms create an enormous amount of product variation around these new technologies. Different firms do business by bringing different products to the market. Many of these alternatives are seen as being subsequently winnowed out through the competitive process. Evolutionary economists see this variety as a function of the fact that emerging technologies are wide open to exploration of their various facets.

This explanation is combined with a second stylized fact: consumer tastes in new markets are ambiguous, inchoate, ill-defined, evolving. This means the market cannot be 'found' or predicted. Alternatively, even if we take tastes to be stable, as Lancaster (1971) and Stigler and Becker (1977) model them, consumption technology is changing – that is, consumers are learning a technology by using it. Either way, what consumers want is ill-defined, so there is no well-articulated demand and therefore no market 'out there' to be found or predicted. This second fact challenges both the descriptive and prescriptive theories about firms doing market research to predict and innovate according to pre-existent demand. Mowery and Rosenberg (1979) and Dosi (1997) have both made compelling arguments against demand-pull theories in general and have accumulated substantial evidence against them. In sum, these contentions add up to the conclusion that demand does not do much to influence the direction of innovation in the early stages of new-market creation. It cannot.

At the moment, theories of market process have accommodated these two facts by assuming that different entrepreneurs/firms make different guesses about demand (for example Geroski, 2003). The fact that consumer tastes are ambiguous means that, *ex ante*, any guess about how to explore the technology in order to embody it into a product is just as good as any other. Stronger versions of the same thesis involve superior perception, intuition, information, or knowledge about the demand side (Kirzner, 1997) – the idea that some people are better guessers than others. Formulating the problem this way suggests entrepreneurs lay bets on the evolution of key exogenous variables – Olson and Kahkonen's four 'primitives': technology, preferences, factors of production, and institutions (Olson and Kahkonen, 2001). The standard logic is that these factors determine the structure of payoffs and so set the scene for action. The theory assumes that a large number of entrepreneurs exist and that some of them are more alert and perceive the structure of incentives more correctly than others (Baumol, 1994; Kirzner, 1997). As Arrow put it, '[W]e really postulate that when a market could be created, it would be' (Arrow, 1974: 8). Indeed, if we 'scaffold' the entrepreneurial choice process highly enough (Denzau and North, 1994), then it is well known that there is in fact no need for an entrepreneur in this process, let alone for anything like effectuation (Metcalf, 1998, 2004). Which markets come to be are simply determined by the states of the exogenous variables.

The bottom line of this approach to new-market emergence is that entrepreneurship is just monkeys and dartboards all over again. This general approach has been used extensively by researchers to explain entrepreneurial action in new-market creation and, in my view, has been amenable mainly because of the ease with which the analyst is able retrospectively to reconstruct 'correct' entrepreneurial perceptions, judgments and 'visions' of new markets (Allison and Zelikow, 1999) or ignore entrepreneurship by attributing outcomes solely to *post hoc* selection.

I believe there are at least three significant problems with accounts of new-market creation in this idiom. First, not only do they not explain much about how new markets come to be (in my opinion), but they are also falsified by empirical evidence. Entrepreneurs do not 'leave it' to differences in tastes or behavior to build markets. They work very hard to make tastes cohere and to concurrently embody them into particular transformations in real artifacts. These realities not only square off with contemporary marketing literature (Carpenter and Nakamoto, 1989, 2000), but also with historical accounts of entrepreneurial market creation (Bazerman, 1998; Koehn, 2001) and with recent evolutionary theory of consumption behavior (Aversi et al., 1999; Bianchi, 1998; Robertson and Yu, 2001). In other words, there is ample evidence that entrepreneurs do not take 'the market'

as given. Instead, ‘the market’ – that supposedly exogenous selection regime of great precision – has the potential of evolving down a great many different paths, not the least depending on the institutional structures that are created to channel the exchange activities of both buyers and sellers (Loasby, 1999; North, 1990). Therefore, it simply isn’t true that markets are ‘givens’. If individuals knew what they wanted (to the degree and precision that a neoclassical economist would like) and/or if the environment maximally constrained what agents could do (to the satisfaction of the die-hard sociologist), new-market creation would actually be easier and happen faster than the facts warrant. Well-established markets can be taken as given. New markets are not givens. Instead, it would be better to think of new markets as very contingent entities made up of the bits and pieces of realities already experienced.

Secondly, instead of a neat winnowing down of variety and the institutionalization of a few markets, what we actually observe is large and persistent variety in markets, coupled with continuous unrest, change and innovation. As McMillan remarks: ‘Markets have been around as long as history and have been incessantly reinvented’ (McMillan, 2001). Markets are actually very granular entities: talk of ‘the’ market obscures the fact that variety is the rule in markets. The market system is precisely one that is marked by enormous heterogeneity and persistent evolution. And the diversity keeps going, all the way down. To quote Griliches and Mairesse (1995: 198): ‘We . . . thought that one could reduce heterogeneity by going down from general mixtures such as “total manufacturing” to something more coherent, such as “petroleum refining” or “the manufacture of cement”. But something like Mandelbrot’s fractal phenomenon seems to be at work here . . . the observed variability–heterogeneity does not really decline as we cut our data finer and finer.’ So, if we suppose that variety and change are features of early-stage markets only, there is something wrong with our analysis. Both variety and change persist.

The third problem is that the usual suspects are at work undermining the nice clean logic of the structure of payoffs: let’s hear four cheers for uncertainty, isotropy, ambiguity and bounded cognition! It is perfectly reasonable to suppose that there are laws of physics that constrain technology (Davidson, 2001), that customers will make up their own minds about their preferences (Hayek, 1961), that the supply of factors of production is fixed in the short term, and that exogenous institutional structures are out there (Olson and Kahkonen, 2001). Yet all of these elements are only constraints. They do not determine entrepreneurial action. Using the example of U-Haul, Saras has pointed out the difference between the role of the environment in providing the necessary conditions for action, without being sufficient to determine action:

[The entrepreneur's] . . . primary means combine with contingencies to create an effect that is not pre-selected, but gets constructed as an integral part of the effectuation process . . . In cases of spectacular success the effectuating entrepreneur's vision appears to involve more than the identification or pursuit of an opportunity – it seems to include the very creation of the opportunity as part of the implementation . . . The latent market for U-Haul, consisting of the obvious widespread need for one-way rentals, is only a necessary condition for its actualization. Sufficiency is provided by active implementations of imagined solutions . . . (Sarasvathy, 2001: 249)

An effectual approach addresses each of the three issues I am attempting to articulate here: that entrepreneurs do not leave it to the market to decide; that markets are individualized, variant and changing all the way down; and that environments are insufficient to determine action. Effectuation does this by suggesting a different way of theorizing entrepreneurial action, mainly by changing the focal point of our conceptions of action. There is indeed an environment – a capsule, if you like – in which action takes place. But the controls of the plane are in the hands of the pilot. And so effectuation draws attention away from the idea that macro-variables determine action and places the locus of action instead at the micro-level: with the pilot in the plane (Cohendet et al., 1999). Or, as we'll see, the *pilots* in the plane.

The thrust of much of my recent work in collaboration with Saras consists of an extended attempt to work out some of the details of some aspects of effectuation. In particular, my work has been concerned with the process of effectuation (which Saras has laid out in Chapters 1 and 5). In the next section I describe what I've been up to lately.

12.1.2 Relating Effectuation to the Birth of a New Industry

In 2001, I came into contact with the Pacific Northwest National Laboratory (PNL) run by the Battelle Memorial Institute (BMI), in Richland, WA. Battelle, founded in 1924, employs 7500 scientists, engineers and support staff conducting \$1 billion per year of research for 2000 companies and government agencies, receiving 50 to 100 invention patents each year in the areas of pharmaceuticals, agrochemicals, energy, transportation, environment, health and national security. Four thousand of these people work at PNL. It also co-manages the Brookhaven National Laboratory, and the Oak Ridge National Laboratory, has major technology centers in Columbus, Ohio, and Geneva, Switzerland, and facilities in 40 other locations. So Battelle looked like a pretty good place to go to try to satisfy my curiosity.

One reason PNL looked like a promising place to investigate new markets was because Battelle has a history of inventing technologies that

spawn major new markets. A good example is xeroxing. Battelle invented xeroxing in the 1940s and filed more than 250 patents related to the process. Its equity stake in Xerox (originally the Haloid Company) came to be worth billions of dollars in the late 1960s and enormously enlarged the institute's research endowment. Yet while Battelle sometimes harvested the rewards of its inventions, it also had some big misses, which is one of the reasons it is an interesting organization to study. Compact disks (CD-ROMs) are a case in point. In the late 1960s Battelle saw no future for this invention and therefore licensed it for a trivial fee. Phillips and Sony eventually acquired those licenses and made billions out of the technology. In the course of my research I acquired a copy of the more than 30-year-old Battelle memorandum ordering the licensing of the technology, which was ceremonially pinned to the wall of one entrepreneur's office. This entrepreneur was an ex-Battelle employee who had spun out a startup firm based on technology developed at Battelle that – like the CD-ROM – the organization thought was of little commercial value.

I researched several entrepreneurs, technologies and markets during my visits to Battelle and spent a lot of time talking with lab managers responsible in one way or another for commercializing technologies. By June 2002 it was apparent that one of the technologies I was researching was spawning a major new market that was transforming its industry. Since then I have focused my research on this one industry: RFID (Radio Frequency Identification). I'll explain more about RFID later in this chapter, but first I want to draw out a couple of methodological points that I think are absolutely crucial for anyone out there who is thinking about doing research on effectuation, or entrepreneurship in general.

First and most simply, if you want to do interesting research, you simply can't beat getting 'out there' and kicking some stones. This is what archeologists do, and they do it for a reason: there simply isn't much to say in archeology without some fragments of the past that have been sifted out from among all the rocks out there. There are two important ideas here. First, 'young' ideas (like effectuation) need data to build on. It is the only way we'll know if the idea of effectuation has any teeth or not. There are lots of ways of acquiring this data, and if the idea of effectuation is robust there will eventually be lots of data on it; but because it's a new theory, data haven't been systematically collected on the key variables. So, new theories need original data collection. In fact, the history of science (Kuhn, 1962) would suggest that getting the data-collection machine running is vital to creating theory. The other issue is sifting. Data collection inevitably involves making some choices about what is important and what's not. Other researchers have sifted differently. It is from among those things that past generations of researchers have tossed aside as worthless that the new generation finds its gems.

The second thing I want to generally draw attention to is what I call the ‘discovery’ problem, the fact that the passing of time breeds certainty. Look at almost any phenomenon, and it looks very different *ex post* than it appeared *ex ante* to the people who were actually trying to make decisions at the time. By the time the researcher gets involved after the event, it always looks as if all the facts that decision makers needed were just sitting around waiting to be ‘discovered’ and neatly packaged for rational choices. For example, looking back on the RFID industry from the standpoint of 2005 is inherently misleading. The development of a market for low-cost RFID tagging (wireless barcoding) has already begun to seem like an inevitability, another case of a superior innovation sweeping aside an inferior incumbent (in this case, it is barcoding that is being swept aside). Yet in 2002, when I interviewed key participants in the new market, many thought low-cost RFID an impossibility (abundant data are available on this issue, something I’ve documented elsewhere: Dew, 2003). In fact, key decision-makers went out of their way to stress that ‘this is not a tree yet growing’ and that ‘it will depend on what we all, acting together, do’ (Ashton, 2002). Since then many minds have changed, and events in the RFID industry have taken on an air of certainty and inevitability that is inherently misleading for any researcher approaching the industry now. This is the discovery problem, and it is particularly corrosive to the study of entrepreneurial decision-making because, *ex post*, hindsight draws researchers to scaffold the choice set with data, knowledge and preferences that emerged only as a consequence of certain choices (Allison and Zelikow, 1999; Denzau et al., 1996). One answer to this problem is, of course, to study phenomena in real time. In my own work, I’ve studied the real-time emergence of the new RFID industry. I call this *contemporaneous* case study because it is studying of a phenomenon that is still very much in the making. Because uncertainty and ambiguity largely define the problem space for effectual reasoning, I suspect that contemporaneous research methods of various kinds are going to be an important aspect of data collection on effectuation. This doesn’t have to be contemporaneous case study: experiments, problem sets and think-aloud protocols all serve to simulate the problem space.

12.1.3 The RFID Industry as a Research Site for Effectuation

RFID tags are wireless barcodes. The technology was spawned by the invention of radar and has sometimes been described as ‘radar for everyday products’ (Kirsner, 2002). Research and development in RFID took off in the 1970s, and mainstream adoption of the technology started in the 1980s with toll-booth payment systems. Microchip-based RFID tags were

developed in this period. They consist of a microchip coiled with an antenna, like little electric hotplates. These tags are ‘passive’ because they require no battery; instead, they get their power from the interrogation signals of RFID readers. Applications for RFID sprang up in access systems for cars and offices, as well as payment systems (ExxonMobil’s Speedpass pay-at-the-pump system) and animal identification (cattle, fish and, yes, the microchips embedded in your household pet). The US Department of Defense developed RFID in many ways, including experimenting with RFID-equipped insects: bumblebees to find landmines and remote-controlled cockroaches to carry sensing devices. Then, in 1999, a consortium was formed at MIT to develop a new generation of RFID that is cheap enough to be disposable. The idea was to transform RFID into a wireless barcoding technology. The consortium was called the Auto ID Center and eventually consisted of 100 major organizations, including Wal-Mart, Gillette and UPS. It is the emergence of this new generation of RFID from 1999 to 2005 that I have been researching.

Interesting idea 1: exaptation

I sometimes joke that this was what the Internet was invented for. Kevin Ashton, in Fildes (2002: 45).

The first reason the RFID industry seems like an interesting industry in which to gather empirical evidence relating to effectuation is that the industry reads like a case history of alternative generation. It is an industry marked by the gradual and steadily grinding extension of the list of objects subjected to automatic identification using RFID tags. Just about everything that can be tagged has been: animals, fish, old people, kids, soldiers, criminals, packs of lettuce, tires, missiles, railcars, rental equipment, rifles, aircraft brakes, pallets . . . the list is virtually endless. In principle, RFID tags can be put on anything – perhaps everything. Indeed, at various points the idea of putting RFID tags on everything seems to have occurred to many individuals.

This means that the basic story of the RFID industry does not look at all like the normal evolutionary story of adaptation. Instead of being a story of technology being developed and adapted for a known use, the RFID story is an upside-down version of adaptation: it is a story that evolutionary biologists call *exaptation* (Dew et al., 2004). RFID was designed for one thing but has steadily been applied to other uses, all other than the original use for which it was designed. Kevin Ashton, in the quote above, makes a very similar point about the internet: it seemed as if it was invented for one thing (people-to-people communication: e-mail, websites, chat,

etc.), but now we've got it we are finding that actually we can do a lot of other things with it too (like object-to-object communication: what Ashton jokingly started calling the Internet of Things). So instead of being designed for a specific niche and then diffusing in that niche, RFID is a technology that was designed for one thing and has diffused by steadily branching off into new and different use domains, niches, markets. Indeed, these niches have been created by RFID's branching process.

This phenomenon – exaptation – has been recognized either explicitly by name or implicitly without being named by a number of scholars, including Joel Mokyr (1998), Nathan Rosenberg (1996b, 2001) and Dan Levinthal (1998). According to Mokyr, 'The basic idea is that a technique that was originally selected for one trait owes its later success and survival to another trait which it happens to possess'. Levinthal referred to the process of connecting up a technology to an alternative use domain as a 'quintessentially entrepreneurial phenomenon'.

In my view, what is quintessentially entrepreneurial about exaptation is that it is effectual. One of the basic premises of effectuation is that it is means-driven, focused on the question 'What can we do?' with our means rather than 'What should we do?' given our environment. One obvious formulation of this means-driven technique is captured by the old adage, 'To a man with a hammer, the world looks like a nail.' Effectuation points to the fact that entrepreneurs look at the hammer in their hands and ask themselves not only 'What can we do with a hammer?' but also 'What else can we do with a hammer beside hit nails on their heads?' This process of asking 'What else?' is innately focused on generating variation in unanticipated and often playful ways. Therefore this aspect of effectuation is a method of generating exaptive variations. It transforms resources by converting them from established uses (things they were designed for) to new uses (things they weren't designed for). In other words, entrepreneurs tend to use resources in ways for which they were not originally designed. This innovative process is at the core of value creation.

It is worth noting that this method of generating variation contrasts with other ways of producing variation, such as the idea of adaptation where, in a world full of nails, variations of hammers are devised to best suit different kinds of nails. Of course, adaptation is a reality. One famous fact in technology history is that there were reportedly 1000 different kinds of hammers in active employ in the city of Birmingham during England's Industrial Revolution. But adaptation is not the only reality. There is a high incidence of exaptation too.

Instead of using means adaptively, effectuating entrepreneurs are best described as using means exaptively. A good example is the story of Riverdale Mills, founded in 1978 by entrepreneur Jim Knott. Riverdale was

founded to make lobster traps. Knott came up with the idea of making lobster traps out of a material he called 'Aquamesh' (a plastic-dipped galvanized wire mesh) on a trial-and-error basis after years of personal experience with wooden lobster traps that kept rotting and falling apart. But after 20 years, during which Riverdale became stunningly successful in the lobster trap market (with 90 per cent market share), it is now becoming better known for security fences. Why? Well, it turns out that Aquamesh is not only incredibly durable but also has such tiny openings that it is virtually impossible to scale or cut through. So now Riverdale sells 'Wirewall', which is just Aquamesh by another name. I would call this an exaptation, because it's an example of something that was originally selected for one trait owing its later success to another trait it happens to possess (Mokyr, 1998). Post 9/11, Riverdale's sales of Wirewall jumped tenfold. According to Jim Knott, 'Nobody uses wooden lobster traps anymore . . . And nobody's going to be using chain-linked fences for security anymore, either' (Crowley, 2002).

The history of technology is full of examples like this – stories of resources and technologies that were initially thought to be of little or no value. Citing many examples, Rosenberg concludes that 'this listing of failures to anticipate future uses and larger markets for new technologies could be expanded almost without limit' (Rosenberg, 1996b). We simply cannot pre-state a finite list of all possible exaptations of resources and technologies that exist in the world because we cannot predict ahead of time all of the context-dependent and actor-centric ways in which resources and technologies may become useful over time. This is precisely why we need effectuation: it helps us explain how the list of novel artifacts is actually created.

So, a key lesson of the RFID industry is that causal/adaptive approaches result in very different ways of using resources and technologies than an effectual/exaptive approach. By introducing exaptive variations (instead of adaptive ones), effectual entrepreneurs potentially create a broader and different range of variation than adaptation alone would create. Effectuation is explicitly exaptive in its orientation and is guaranteed to generate variation, however useful or valueless it may prove to be down the road. It may also be true that patterns of the generation of exaptive variation will be evident, suggesting a very different basis for modeling the evolution of firms, markets and industries than the common assumption that variation is random. For instance, it is possible that a set of variations might be considered by the entrepreneur with the selection of one or more effects on the basis of affordable-loss criteria, or the extent to which they believe they can influence the subsequent environment for an effect. This is one example of how effectuation leads to different predictions than extant

theories: instead of expected returns (garnered from analysis of the environment) dictating which project an entrepreneur pursues, the entrepreneurs' affordable-loss criteria dictate which project gets pursued. This leads one to anticipate just the kind of pattern of entrepreneurial market 'entry' that empirical studies of industry evolution have actually observed: it looks like it's 'all over the place'. Just as likely, the entrepreneur might simply proceed to act in a contingent fashion, starting with the first effect that comes to hand and proceeding from there with whatever exaptations stakeholders are willing and able to go along with. To understand how that process works, it is useful to take a fine-grained look at the way in which one alternative developed in the RFID industry.

Interesting idea 2: transformation by stakeholder commitments

In effectuation, one way alternatives are created is by putting technologies and resources to work in the context of new stakeholder relationships. The basic theoretical outline for this crucial idea is included in Chapter 5 of this book. The theoretically interesting aspect of the model is the interaction between members of an 'effectual network' and the design of a particular 'effectual artifact'. Simply put, instead of being initially conceived of as 'ready-to-go' items, novel artifacts (technologies, markets, organizations) are posited to be designed on the fly by a network of stakeholders that an entrepreneur accumulates. What the artifact eventually comes to look like depends on the chain of stakeholder commitments the entrepreneur builds.

In this section I want to use my research on the RFID industry to illustrate this aspect of effectuation.

I started with the following puzzle in the RFID industry. A major new market is emerging in the RFID industry for low-cost RFID (called the EPC: the electronic product code). This wireless barcode has been created by a consortium of 100 of the world's largest organizations. Yet the first striking fact I discovered about the Auto ID Center, with members such as Wal-Mart, Phillips Semiconductors, and Procter & Gamble, was that it owed its origin to two MIT roboticists with a research interest in what is sometimes known in robotics and computer science as the 'perception problem'. The seminal innovation was created by David Brock, a roboticist who imagined every object being embedded with an RFID tag carrying a unique identification number (now known as an EPC). Just as we browse the internet by clicking on hypertext links, Brock imagined robots 'browsing' a room full of objects by using their RFID reader to 'click' on tagged objects and going to a web page to 'see' information about the object, such as what it is and how to pick it up. From this idea, an infrastructure for objects to communicate with other objects developed into a new market in the RFID industry that the protagonists eventually called the 'Internet of

Things'. But how could it be that a simple invention by an MIT robotocist (Brock) ends up creating a world full of cheap, disposable RFID tags adopted by the world's largest consumer goods and retailing organizations?

The first thing to recognize is that Brock inhabited an effectual problem space: his idea (means) spoke not to one but to many different effects (ends). The proliferation of possible effects that can be caused with an idea – call it Widget *X* – means it is not obvious how to operationalize the idea. Hence the effectual situation: on the one hand, the means (the idea, technology, the actors' means, etc.) are clear and often quite difficult to change; on the other hand, the operationalizations (the application, market) are ambiguous and flexible.

Brock started by simply sharing his ideas with a colleague, Sanjay Sarma. The two shared a passion for robots (in effectuation, who you are matters). Sarma became a research colleague after the two co-taught a course at MIT. 'He was a nice guy. We got on well', Brock said. (Brock thus leveraged another of his most basic means: whom he knew.) Sarma said that when Brock came to him with his idea, 'He was just thinking from a computer science point of view.' In the beginning the pair did what they could working out of a storage closet, hacking up demos (a microwave oven that automatically cooked tagged packets of food) and scrounging for resources from colleagues (\$100 000 from the Mechanical Engineering department) and sweat equity from students they knew at MIT (the affordable-loss principle).

Then Brock and Sarma had a chance meeting, a contingency they could not have predicted:

In early 1999, Sarma and Brock were presenting their ideas about the possibility of putting RFID tags on every-day products at an event looking at the Home of the Future. After the speech, Sarma was approached by Kevin Ashton, then a brand manager at Procter & Gamble. Ashton was looking for a way to create cheap RFID tags that could be put on lipstick and other products, so they could be tracked from manufacturing to the store shelves. He asked Sarma if he thought that putting only the serial number on the tag would bring down the cost. Sarma said yes. That got Ashton and P&G interested in backing the effort. (Roberti, 2002 (interview))

That Kevin Ashton met Brock and Sarma was a real twist of fate. Ashton only went to the Home of the Future meeting to 'cover' for one of his fellow workers whose meeting schedule was double-booked. Ashton said that he 'had a bit of free time and another P&G colleague said, "There is a meeting over in the architecture department that I'm supposed to be going to but can't, will you sit in for me?"' . . . so I had nothing else to do so I went along' (Ashton, 2002 (interview)). And so a strange network of lipstick salesmen and roboticists began.

Ashton was leading the development of P&G's corporate strategy for embedded technology and was 'was running around with a fishing license from P&G trying to work out what the hell we needed to do to get a microchip in everything in the world basically' when he accidentally happened across Brock and Sarma. The day after Ashton met the duo, he had a meeting with Sarma: 'What I brought to the meeting was "here is what my need is" . . . so I took him through the supply chain applications we [P&G] had in mind. They [Brock and Sarma] were thinking of somewhat different applications'. Ashton's willingness to back Brock and Sarma transformed Brock's idea into an industrial supply-chain system, which was something he hadn't contemplated before. Call this Transformation 1 of Brock's idea, from Widget X_a to Widget X_b .

What we see here transparently – in the shape of Brock, Sarma and Ashton – is the effectual process by which an initial idea is transformed by the arrival of new stakeholders. An idea is being stitched together, patch by patch, piece by piece, into a distinct technological variation. Here we start to see a microfoundation for variation creation that is based on bounded cognition, is consistent with partial knowledge (the players all have idiosyncratic, specialized points of view that they bring to the table), and makes no unrealistic assumptions about the decision-maker or environment. There is very limited reliance on prediction. The whole set of events rests on means, contingencies, affordable loss, and negotiating with stakeholders. The Brock–Sarma–Ashton stakeholder chain is one empirical manifestation of the effectual process; yet the underlying theoretical explanation is perfectly generalizable.

However, the wheels of fate had not yet finished turning. A month after meeting Sarma and Brock, Ashton had another chance encounter, this time with barcode pioneer and longtime standards champion, Alan Haberman:

Somewhat later . . . I'm suspecting it was probably April, I went to a standards meeting and conference in Antwerp, Belgium where I sat through what was a very boring meeting of the Auto ID Manufacturers Association where I met Alan Haberman the first time. Alan, I think, introduced himself not in his UCC capacity but as his capacity of Chairman of the ISO committee on automatic identification, so he certainly looked like someone I wanted to talk to. So he and I had a drink after the meeting. One of the things he said was that he was looking for a university to fund research into automatic identification technology on behalf of the UCC so I suggested he contact Sarma and Brock. And it turned out that Alan lives in a suburb of Cambridge, Massachusetts, just up the road from David Brock, so it was very easy for them to hook up. (Ashton, 2002 (interview))

Haberman, who is frequently called 'the father of the barcode', had spent two years (1997–99) touring universities around the USA searching for a technology to follow on from the barcode that was a 'barcode that had

no line of sight involved', which is what RFID is. In his own (somewhat colorful) words:

And then [I] met a young man by the name of Kevin Ashton, and son of a bitch, we had the same god damn vision. And he said, 'here are some guys that you've got to meet that I've stumbled on.' And that's how we met Sanjay Sarma and David Block and Sunny Sui and the group that were thinking about the universe of things, okay; things talking to things. (Haberman, 2002 (interview))

So Haberman told Brock and Sarma he wanted to fund them to discover what would come after the barcode: namely, to convert Brock's RFID architecture into an industry standard RFID system for cheap wireless barcodes. This transformed Brock's artifact again, this time into an up-and-coming replacement for the barcode, which was something Brock had not initially contemplated at all. Call this Transformation 2, taking Brock's initial idea from Widget X_b to Widget X_c based on Haberman's commitment, which further transformed Brock's artifact.

This brief sketch of the early happenings in the birth of the new RFID industry shows how effectual commitments explain the step-by-step transformation of an idea conceived by an MIT roboticist into an industrial standard for cheap disposable RFID tags. There is no magic in the story: it is just a simple story of the contingent formation of an effectual network and the concurrent contingent design of what turned out to be an important new alternative in the RFID industry. In a way, these are all just consequences of a little entrepreneurial 'fooling around' with novel interactions between technologies and different stakeholder combinations. Individual stakeholders are always unique, and stakeholder commitments are inherently heterogeneous. This sketch shows that effectuation inverts the idea that entrepreneurs search for markets that are already 'out there' somewhere through processes of prediction and envisioning. Effectuation suggests instead that alternatives are built by piecing together networks of stakeholders in a local and contingent fashion. Sometimes an alternative later proliferates, as the EPC appears to be doing.

In principle, examples like this suggest effectuation is ideally suited to understanding how alternatives develop in their very earliest stages. It provides a promising framework that illuminates stakeholder-dependent elements in the development of technologies, markets and industries.

12.1.4 Why Does This Matter?

I have touched here on several ways in which effectuation can be useful in the context of the evolution of markets and industries. Effectuation can help explain how a market's time comes and which markets come to be

because it helps explain how entrepreneurs create interesting new artifacts (new firms, products and markets) by exapting and transforming existing artifacts. The proximate causes of these exaptations and transformations are plausibly described by the model of effectuation, particularly when the dynamics of effectuation are understood. As one of the participants in my study of the RFID industry (a long-time – now retired – technologist) told me (Eberhardt, 2002):

In terms of the question of the timing, it would seem to me to be uncanny if the technology [for RFID] was all coming together at the right time . . . That seems to be too fortuitous to be true.

In other words, an explanation that relies on pure chance is lacking.

And that really raises the question on how much . . . is necessity the mother of invention . . .

In other words, explanations that posit that new markets are an inevitable product of demand-driven incentives are lacking.

[Or] how much was it just a question of a bunch of people getting together and saying . . . '[S]o now we are going to start a research process, basically for a new way of doing things'.

In other words, the pilots mattered. That is one of the things effectuation is all about.

12.2 STUART READ ON EFFECTUATION AND NEW-VENTURE PERFORMANCE¹

Much effort has been applied to the theoretical implications of effectuation theory that relate to behaviors we might expect and artifacts that might be generated through effectual action. In this section, we attempt to extend that thinking to understand the impact of an effectual approach on performance. Although effectuation is a general theory of decision-making in uncertain situations, we focus this discourse initially on the relationship between an effectual approach and the performance of a new venture. While there are many other artifacts that may be generated using an effectual approach, the new venture offers a good first test of the relationship with performance because effectuation was developed using a new-venture scenario, and the new-venture setting can be generalized as a truly uncertain situation. Further, there is extensive research into new-venture

performance, offering us a variety of perspectives, constructs and knowledge to provide a foundation for our investigation. Our journey into this topic begins with a thorough review of the new-venture literature, searching for constructs that operationalize the principles of effectuation. Our search yields 24 articles that measure constructs defined by effectuation and analyse the relationship of those constructs with new-venture performance. We proceed to use the statistics from those papers to conduct a meta-analysis of the relationship between an effectual approach and new-venture performance. Our analysis uncovers a series of interesting findings about the measurement of both an effectual approach as an independent variable and new-venture performance as a dependent variable. We discuss our findings in detail and offer suggestions to researchers interested in future work in this area. We close by attempting to provide a general model that may prove fruitful for further investigation of the relationship between effectuation and performance.

12.2.1 Theoretical Framework

As a reminder, we present the principles of effectuation, suitably modified for the purposes of this meta-analysis, in Table 12.1. Each of the six principles represents an approach to a particular class of decision-making that

Table 12.1 Principles of effectuation

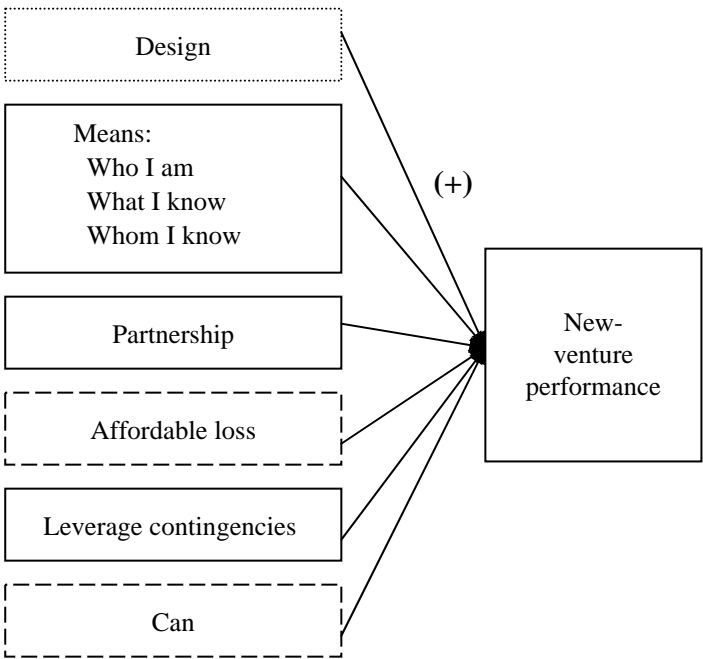
Issue	Effectual principle
View of the future	<i>Design</i> The future is contingent on actions by willful agents.
Givens	<i>Means</i> provide the basis for decisions and new opportunities; three subconstructs: <ul style="list-style-type: none"> – Who I am – What I know – Whom I know
Attitude toward others	<i>Partnership</i> Build <i>your</i> market together with customers, suppliers and even prospective competitors.
Predisposition toward risk	<i>Affordable loss</i> Calculate downside potential and risk no more than you can afford to lose.
Predisposition toward contingencies	<i>Leverage contingencies</i> Surprises can be positive. Leverage them into new opportunities.
Basis for commitment	<i>Can</i> Do what you are able to do – based on imagination and satisficing.
Underlying logic	To the extent we can control the future, we don't need to predict it.

is non-predictive and that assumes the impact of willful individual creation.

We use our theoretical framework to guide literature selection, variable identification and construct positioning for effectuation. We develop our meta-analysis using measures from existing literature to illustrate how effectual approaches affect new-venture performance (Hunter and Schmidt, 1990). Because effectuation was derived from expert entrepreneurial action, and experts outperform novices and the general population (Ericsson and Lehmann, 1996), we hypothesize a positive link between effectual approaches and new-venture performance. Figure 12.1 presents our model.

12.2.2 Analysis

Our approach to the meta-analysis followed the steps outlined by Lipsey and Wilson (2001). Having established our relationships of interest, we began data collection by searching the literature for studies that meet the



Note: We were not able to measure constructs denoted in boxes with dashed lines.

Figure 12.1 Theoretical model

following four criteria: (1) the study investigates companies that can be described generally as new ventures; (2) the dependent variable measures the actual performance of a new venture in terms of financial success or the achievement of objectives; (3) the set of independent variables includes at least one construct germane to effectuation theory; and (4) the study provides the descriptive statistics necessary to the meta-analysis algorithm.

We used two methods for selecting articles for the meta-analysis. First, we initiated a series of computer queries of the ABI/INFORM database using specific keyword searches. On the basis of a review of the abstracts of general new-venture articles, we searched all the combinations of performance terms (performance, ROI, return on investment, sales growth, revenue growth, ROA, survival, return on assets, return on equity, ROE, and employee growth), firm description terms (new, small, early, early-stage, fledgling, emerging), and terms for firms (venture, firm, startup, company, companies). We looked for research appearing in 1984 or later in order to provide some control for current economic and funding conditions. Secondly, we searched the reference lists of all the articles we identified during the first step both as a means of identifying work we had missed and validating the relevance of work we had chosen. In cases where studies met our first three criteria but did not have sufficient descriptive statistics to be included in the meta-analysis, we contacted authors to request additional information.

We then organized studies into different groups around effectual constructs and combined the results from different studies using meta-analysis (Hunter and Schmidt, 1990; Lipsey and Wilson, 2001). To measure the association between new-venture performance and one of the principles of effectuation, we used a standard meta-analysis statistic, the Pearson correlation coefficient. Non-Pearson measures of association were discarded because they may exhibit different standard errors (Hunter and Schmidt, 1990: 206). In indicated instances, to preserve statistical independence, we calculated an average correlation from a single citation that provided two or more correlations with performance and similar measures of a given effectual approach (*ibid.*: 476). We did the same for studies that provided correlations of an effectual approach with more than one performance measure meeting our criteria. Once the data are organized, the literature suggests a next step of making corrections to the individual observations to ensure consistency in measurement across studies (Hedges and Olkin, 1985; Hunter and Schmidt, 1990; Wolf, 1986).

Reliability correction

Because we were able to obtain reliability measures for every study in which subjective measures were used, we corrected directly for variable

measurement error in correlation using Hunter and Schmidt's (1990) construct validity correction according to the following formula:

$$r = \frac{r_0}{a_1 a_2}$$

where r denotes corrected correlation; r_0 denotes the raw Pearson correlation between variable 1 and variable 2; a_1 denotes the value of Cronbach's α for reliability of variable 1; a_2 denotes the value of Cronbach's α for reliability of variable 2.

Correction for dichotomous variables

We encountered dichotomous variables in two studies. Neither study gave us information about the distribution of responses, so in accordance with Hunter and Schmidt (1990: 46), we assumed a 50/50 split and made the appropriate correction according to the following formula:

$$r = \frac{1}{\rho_2} r_0$$

where r denotes corrected correlation; r_0 denotes the raw Pearson correlation between variables; and ρ_2 denotes the value of the study population correlation.

We completed the correction by adjusting the weight of the studies for the larger sampling-error (?) variance using the following formula:

$$W = N^* (\rho_2^2)$$

where w denotes the corrected study sample size; N denotes the study sample size; and ρ_2 denotes the value of the study population correlation.

Fixed effects versus random effects

We performed a heterogeneity test on each meta-analysis to guide us in deciding whether to interpret the fixed-effects (Hunter and Schmidt, 1990) or random-effects (DerSimonian and Laird, 1986) model. Neither model can be considered ideal for all situations. The random-effects model assumes that samples are drawn from populations with different effect sizes, resulting in assumptions that may not be sufficiently conservative in all situations. Conversely, the fixed-effects model ignores heterogeneity. Using the Q -value and the associated chi-squared test of significance of the Q -value, we evaluate each meta-analysis individually (Laird and Mosteller, 1990), employing the random-effects model for analyses that exhibit heterogeneity, and the fixed-effects model for those that do not (Lau et al., 1997). Following Hunter and Schmidt (1990), we computed a

mean correlation for each meta-analysis, weighting each study according to sample size. Under an assumption of fixed effects, we calculate the effect size as follows:

$$\bar{Y} = \frac{\sum W_c Y_c}{\sum W_c}$$

where \bar{Y} denotes population-effect size across studies in the analysis; W_c denotes the reciprocal of individual study-effect size variance; and Y_c denotes individual study-effect size.

Under an assumption of random effects, we calculate the effect size as follows:

$$\bar{Y} = \frac{\sum W_c Y_c}{\sum W_c}$$

where \bar{Y} denotes population-effect size across studies in the analysis; W_c denotes the reciprocal of individual study-effect size variance; and Y_c denotes individual study-effect size.

Table 12.2 presents the full data set, organized by effectual principle. We report relevant studies, number of observations in a study, performance measures and associated reliabilities if applicable, specific measures of the effectual construct and associated reliabilities if applicable, and the corrected correlation between the construct and performance. A dash (–) represents an observed measure that is assumed reliable. Descriptions of correlations that have been averaged are contained in brackets and noted as averages.

Dependent measure validation test

We were concerned that the wide range of dependent variable measures used across our set of studies might bias the results, so we conducted a test to validate our findings. We eliminated all the studies with qualitative or subjective measures of financial firm performance and with measures not specific to quantitative firm performance, such as new-product performance or level of corporate venturing. We then ran our complete set of meta-analyses on just the subset. Removing studies based on subjective dependent variables completely eliminated the category of contingency. The results for all other meta-analyses were not significantly changed, providing us some assurance that our results were not biased by performance measures that reflect too broad or unrelated a set of outcomes.

Observed variable reliability validation test

Scholars with significant experience in meta-analytic methods have suggested that observed variables (not latent constructs) might not be 100 per cent reliable. In order to conduct a test assuming that there is measurement error in

Table 12.2 New-venture performance and effectual constructs

Study citation	No.	New-venture performance measures		Effectual construct measures		Effect (Corrected)
		α (reliability)	Dependent variable	α (reliability)	Independent variable	
Means: what I know	2068					0.177
Box et al. (1993)	95	Increase in employee growth	–	Average of (number of startups and years of entrepreneurial experience)	–	–0.007
Chaganti and Schmeer (1994)	345	Average of (return on assets and total sales)	–	Number of years of industry experience	–	0.065
Chandler and Jansen (1992)	134	Profitability (sales and earnings)	0.76	Average of (number of startups and years as owner manager)		0.270
Dyke et al. (1992)	386	Average of (total sales, employees, employee growth, profit, and profit growth)	–	Average of numbers of previous (firms, business starts, businesses owned)	–	0.067
Florin et al. (2003)	275	Average of (sales growth and return on sales)	–	Human resources (industry experience, startup experience and VC directorships)	–	–0.020
Jo and Lee (1996)	47	Average of (return on assets, sales,	–	Average of (education, relevance, entrepreneurial,	–	–0.004

	employees, and growth rate of assets and employees)		startup, functional area, line of business, and high-growth experience)	
137	Sales growth over a 4-year period	—	Entrepreneur's industry specific human capital	0.060
53	Profitability (3-point scale: profit, breakeven, loss)	—	Domain-specific experience (dichotomous)	0.192
218	Gross revenues	—	Average of (prior involvement in a startup and previous industry experience)	0.320
123	Return on sales	—	Top management marketing expertise	0.070
210	3-year average sales growth (log%)	—	Average of (marketing, R&D and manufacturing experience)	0.110
43	Overall performance (16-item construct including sales, financial and international performance measures)	0.77	Overall expertise (sum across functional areas)	0.77 0.831
12	Overall company performance (composite of 8 objective and subjective measures)	—	Years of experience in the field before company startup	0.190

Table 12.2 (continued)

Study citation	No.	New-venture performance measures		Effectual construct measures		Effect (Corrected)
		α (reliability)	Dependent variable	α (reliability)	Independent variable	
Means: who I am	772					0.309
Chandler and Hanks (1994)	155	Business volume (composite of sales, earnings and net worth)	0.81	Overall resource based capabilities	0.86	0.312
Deeds et al. (1998)	89	Market value-added (market value minus capital employed)	–	Average of (firm citations (of top scientists' publication and number of patents) Financial capital	–	0.2085
Florin et al. (2003)	275	Average of (sales growth and return on sales)	–		–	0.190
Lee et al. (2001)	137	Sales growth over a 4-year period	–	Average of (financial resources and technological capabilities)	–0.63	0.663
Zahra and Bogner (1999)	116	Investors' return on equity	–	Research and development investment	0.74	0.349

Means: whom I know	630			0.158
Florin et al. (2003)	275	Average of (sales growth and return on sales)	–	0.210
Lee et al. (2001)	137	Sales growth over a 4-year period	–	0.185
		Social resources (business network, personal network and underwriters)	–	–, 0.67, 0.87
		Average of partnership linkages (to other enterprise, venture capital, universities, venture networks, and financial institutions, and sponsorship linkages (to financial institutions and government))		
Lerner et al. (1997)	218	Business size, profitability, gross revenues and income	–	0.070
Partnership	1733			0.274
Dollinger (1985)	82	Average of (sales, net income and profitability index)	–	0.093
Dowling and McGee (1994)	54	3-year compounded sales growth	–	0.048
		Average of (cooperative business strategy and technology strategy (dichotomous))	–	

Table 12.2 (continued)

Study citation	No.	New-venture performance measures		Effectual construct measures		Effect (Corrected)
		α (reliability)	Dependent variable	α (reliability)	Independent variable	
George et al. (2002)	147	Net sales/assets	–	Number of links (alliances)	–	0.320
Hult et al. (2003)	764	Four specific items from Deshpande et al. (1993)	0.88	Six customer orientation items from Narver and Slater (1990)	0.90	0.393
McGee et al. (1995)	210	3-year average sales growth (log%)	–	Average of (cooperative marketing, R&D and manufacturing activities)	–	0.037
Sarkar et al. (2001)	184	Market performance (market share, sales growth, market development, and product development) from Venkatraman and Grant (1986)	0.75	Alliance proactiveness from Covin and Slevin (1989)	0.72	0.435
Zahra and Bogner (1999)	116	Investors' return on equity	–	Venture's reliance on external sources of technology (4 items)	0.73	0.304
Zahra (1996)	176	Return on assets	–	Use of or reliance on external technology sources	0.84	0.316

Contingency	290				0.420
Barrett and Weinstein (1998)	142	Business performance (Jaworski and Kohli, 1993)	0.87	Flexibility (Khandwalla, 1977)	0.386
Barringer and Bluedorn (1999)	148	Level of corporate entrepreneurship intensity from Covin and Slevin (1986)	0.87	Planning flexibility	0.408

Table 12.3 Detailed results of meta-analyses

	<i>Q</i> -value	Chi-squared significance of <i>Q</i> -value	Fixed or random effect	Point estimate	Standard error of point estimate	Confidence interval: low	Confidence interval: high	Analysis <i>P</i> -value
Means: what I know	70.16	0.000	Random	0.177	0.060	0.059	0.295	0.003
Means: who I am	40.66	0.000	Random	0.309	0.114	0.084	0.534	0.007
Means: whom I know	2.60	0.272	Fixed	0.158	0.040	0.079	0.237	0.000
Partnership	34.02	0.000	Random	0.274	0.063	0.151	0.398	0.000
Contingency	0.05	0.826	Fixed	0.420	0.059	0.304	0.537	0.000
Effectuation overall	218.15	0.000	Random	0.241	0.038	0.168	0.315	0.000

Note: The chi-squared significance of the *Q*-value measures the significance of the test of homogeneity, given degrees of freedom. We set the cutoff at a significance level of 0.10 in accordance with the literature (Lau et al., 1997). If the chi-squared significance of the *Q*-value is less than 0.10, population heterogeneity is assumed and a random-effects model is employed for the meta-analysis. If the value is greater than 0.10, homogeneity cannot be rejected, and a fixed-effects model is employed for the meta-analysis.

our observed variables, we recalculated all correlations between observed dependent and independent variables using a reliability of 0.80 (Dalton et al., 2003), and ran all our meta-analyses again. While several outcomes shifted in significance from ($p < 0.001$) to ($p < 0.01$), our results were not significantly changed, giving us some assurance that reliability of observed variable measurement did not generate bias in our meta-analyses.

12.2.3 Results

Of the principles listed in Table 12.3, because we were unable to identify in the literature existing measures for the constructs ‘design’, ‘affordable loss’ and ‘can’ we present meta-analyses of means, partnership and contingency. From the Q -value and the associated chi-squared term, we assess heterogeneity and determine whether a fixed- or random-effects model should be used. We present our choice of model, and the point estimate, standard error, confidence interval, and p -value statistics from that model. We review each meta-analysis in turn.

Means

Following effectuation theory, we measure the three components of means, articulated as what I know, who I am and whom I know.

What I know While general knowledge can be amassed from a wide range of inputs and sources, we stay consistent with effectuation theory, focusing on the type of knowledge that can be broadly classified as expertise. Expertise is accumulated through years of domain-specific experience (Ericsson and Lehmann, 1996). In an effectual approach, expertise enables managers in new ventures to make decisions without having to rely on pre-existing or predictive goals. From our literature search, we identified 13 studies, representing an overall sample size of 2068, that measured the effect of expertise on new-venture performance. Because expertise should reflect both the time spent and the relevance of the activity to the task at hand, we include only those studies that measure an aspect of experience that would be directly applicable to starting a new venture. For example, this criterion explicitly eliminated education as a measure of expertise, since no measure of education included a corresponding variable describing the relevance of the education to the task of creating a new venture. The results from our meta-analysis indicate that the means of ‘what I know’ is significantly ($p = 0.003$) and positively related to new-venture performance.

Who I am Means, as opposed to goals, provide a basis for action in an effectual approach. Each individual possesses some level and composition

of resources, means that enable some opportunities and constrain others. We measure means at the level of the firm, reasoning that this represents the sum of the relevant means contributed by the founding team to the new venture, and identified five studies representing a sample size of 772 firms. In this category, we include means such as patents, technological capabilities and startup capital. The results from our meta-analysis indicate that the means of 'who I am' are significantly ($p = 0.007$) and positively related to new-venture performance.

Whom I know The third category of means articulated by effectuation theory describes alternatives, opportunities and resources that become available through the founding team's social network. We discovered three different studies, totaling 630 firms, that investigate the impact of 'whom I know' on new-venture performance. We measure the effectual concept of this category of means using the number of contacts available to a founder or founding team, regardless of the degree to which they are used. Similar to the other means, the people a founder knows provide access to other means and new opportunities, providing an alternative to a predictive goal-oriented approach to opportunity creation. The results from our meta-analysis indicate that the means of 'whom I know' are significantly ($p < 0.001$) and positively related to new-venture performance.

Partnership

Effectuation departs somewhat from the mainstream literature on normative corporate strategy in its recommendation that entrepreneurs minimize competitive orientation and instead build firm and market in partnership with external entities. The end result of the creation effort is shaped and defined by the very addition of stakeholders, or partners, to the process. Each brings new means and new opportunities that the effectual founder continues to sculpt into a coherent product, firm and market. We identified eight studies representing 1733 firms that test the impact of partnership against new-venture performance across different partnership constructs. The results from our meta-analysis indicate that a partnership-oriented approach is significantly ($p < 0.001$) and positively related to new-venture performance.

Contingency

Despite the interest in contingency in the mainstream management and marketing literature, we were able to find only two studies investigating the link between a strategy of leveraging contingencies and the performance of new ventures. Those investigations include 290 firms engaged in corporate entrepreneurship projects, and operationalize the concept of leveraging

contingencies as ‘business flexibility’. Effectuation suggests leveraging contingency as an alternative to formal plans based on prediction. In contrast to a causal strategy, according to which a founder pursues a very specific goal, effectuation offers the possibility that the end result may look nothing like the initial idea that caused the founder to form the new venture. Instead, the result is shaped through innovative applications of contingent alternatives that arise during the process of creation. The results from our meta-analysis indicate that a contingent approach is significantly ($p < 0.001$) and positively related to new-venture performance.

Effectuation overall

We then combined 31 studies (24 unique) reflecting 5503 firms (4135 unique) that measure three of the six principles of effectuation to analyse the relationship with new-venture performance. While not surprising given the positive and significant association of each principle with new-venture performance, our aggregate measure of effectuation was also positively and significantly ($p < 0.001$) associated with new-venture performance.

12.2.4 Discussion and Future Research

On the basis of our findings, there is initial support for a positive relationship between an effectual approach to strategy making and new-venture performance. And because this intriguing result will hopefully stimulate further research into this relationship, we focus our discussion on the limitations inherent in our study, with the intention of guiding future efforts. We organize our discussion around the individual methodological issues we encountered in our investigation, matched with suggestions for how to overcome them in future research, and conclude with our general model.

Effectual construct heterogeneity

Our meta-analyses of means: what I know, means: who I am, and partnership returned highly significant Q -values, indicating heterogeneity across samples. And while meta-analyses for means: whom I know and contingency returned non-significant Q -values, suggesting homogeneity, we suspect that low K (number of studies) for those meta-analyses may have generated non-significant Q -values as opposed to genuine homogeneity. We could have eliminated ‘outlier’ studies in each meta-analysis in order to force our analyses to return non-significant Q s, but the underlying meta-analytic algorithms offer alternatives for fixed- and random-effects models, guiding us to select one or the other based on the significance of Q and enabling us to gain inference in this investigation despite heterogeneity.

The heterogeneity statistic is designed to provide insight into whether samples (studies in this case) are drawn from the same or different populations. We screened studies to ensure a reasonable degree of population homogeneity and interpret significant Q -values in this study as indicating construct heterogeneity within a meta-analysis. Meta-analysis was designed to summarize similarities and differences between binary manipulations (such as male or female) or narrow psychological constructs (such as affect or risk aversion). When we utilize the method on the context-sensitive strategy constructs associated with effectuation theory, the breadth of those constructs translates into meta-analytic heterogeneity. Effectual constructs intentionally offer latitude in operationalization in order to accommodate idiosyncratic differences across uncertain situations. Take the case of prior knowledge: an entrepreneur creating a biotechnology venture may likely base decisions on the means of what she knows, means that she may have accumulated through education in biology and physical chemistry. Alternatively, another entrepreneur creating a new retail store may base strategy on other knowledge-based means such as prior selling experience or knowledge of industry cost structure. So while both entrepreneurs employ the effectual approach of basing strategy on knowledge means, the way in which they acquired the knowledge, the areas in which they employ the knowledge, and the content of the knowledge are radically different.

Approaching effectual constructs in context may offer relief to the heterogeneity issues we encountered in our study. The psychology literature supports this approach, highlighting the context-sensitivity of expertise (Ericsson et al., 1996). We employ our example of the biotechnology and retail entrepreneurs to show how asking questions out of context can provide a source of heterogeneity not relevant to our research questions. Context may apply to issues of industry, stage in the new-venture process (Baron and Shane, 2004), and relevant macroeconomic conditions to name a few.

Suggestion 1: compare effectual constructs in context In contrast to traditional psychological measures that can be presented without frame or introduction, effectual measures may need to be preceded with a prime that puts the respondent into a particular new venture context. One tactic for implementing this suggestion may be to lead with a new venture scenario for context and follow with multi-item effectuation constructs that seek to determine the degree of effectual approach used to solve problems. The result may offer greater ability to cleanly compare individual approaches to decision-making as new venture context is shared across subjects.

On this topic, we are not suggesting that meta-analysis is an inappropriate tool for the study of effectuation and entrepreneurship, but rather that the nature of the constructs will generate significant heterogeneity values

as calculated by the Q -statistic given that researchers utilize studies of heterogeneous context. Given that researchers have taken precautions to ensure that the samples included in the analysis are drawn from the same population, those results likely indicate construct heterogeneity and suggest interpretation of a random-effects model.

Suggestion 2: Use meta-analysis, but expect to interpret random-effects models.

Effectual construct availability

We have shown that each of the three effectual principles we were able to measure is positively and significantly related to new-venture performance. However, we are quick to highlight that we were not able to conduct a complete test of effectuation theory as we could not evaluate the principles of *design* and *affordable loss* against new-venture performance. This obvious gap presents rich avenues for future research, so we offer thoughts on measuring each.

In the new-venture setting, the principle of *design* assumes the future is not predetermined by the past, but that stakeholders in the venture shape products, firms and entire markets. Subjective measures of *design* should seek to tap into the degree to which individuals approach decisions in this setting with an orientation toward *prediction* or *design*.

Suggestion 3: design can be measured through an individual's perception of, strategies for, or tactics to influence change in the environment Despite ongoing debates in the literature regarding the issue of entrepreneurial risk propensity (Stewart and Roth, 2004), we were unable to find any quantitative research that approaches the problem in terms of *affordable loss* and *expected return*. Teasing apart the issue using these axes could reveal meaningful differences in perceptions of risk as well as strategies for dealing with risk. Operationalizing *affordable loss* is difficult because it requires the consideration of what each individual calculates as affordable. We expect that the economics literature may offer experimental designs that control for individual differences in this category of investigation. And as the issue of *affordable loss* is inherently an economic calculus, we suggest leveraging that literature for designs to test *affordable loss*.

Suggestion 4: Employ designs from experimental economics to measure affordable loss.

Decision-making frame of effectual constructs

The results of our analyses demonstrate the significant role that, for example, an entrepreneur's means play in new-venture performance.

However, the formulation of means employed in the literature is not completely in line with that of effectuation theory. While effectuation theory recognizes the importance of possessing specific means, the theory recommends that entrepreneurs be guided by a means orientation in decision making, in lieu of being tethered to specific goals. Because we were unable to locate any studies that investigate the subtlety of a means orientation to strategy making, we applied the nearest formulation available to us: the means available to the entrepreneur. This example suggests another interesting avenue for future research. A significant contribution could be made building and testing the construct of a means orientation to decision making, determining the impact of existing means on that the propensity to employ a means-oriented approach, and linking the entire construct to new-venture performance. More generally, this same issue applies to the effectual constructs of *means*, *partnership* and *contingency*. From a purely effectual perspective, each should be operationalized not as quantities of *means* or *partnerships* possessed by the individual, but the degree to which the individual bases decisions on available *means*, or existing *partnerships*.

Suggestion 5: measure effectual constructs of means, partnership, and contingency as a function of how existing levels frame decisions.

Suggestion 6: measure the inputs to effectual constructs, such as means available, separately.

Small *K* number of studies

Though often used with data sets that include *K*s greater than 40 (studies) and *N*s in the thousands of subjects, meta-analytic techniques are designed to calculate effect sizes and significances for samples of smaller size. Increasing both *K* and *N* enables greater precision regarding both statistics, and should be viewed as a goal for future research on effectuation. Further, a larger *K* number of studies will also enable the exploration of covariates within the data (Sultan et al., 1990), an effort we were unable to pursue as the method splits the sample, requiring sufficient *K* such that half is still large enough to be significant. As we have shown a positive relationship with three effectual constructs and new-venture performance, we hope to encourage future research to appreciate the importance of effectual constructs and include them in future research efforts, if only as control variables. This approach will permit future efforts to improve variance accounted for in individual studies and will enable those studies to be used in future summaries of the literature.

Suggestion 7: include effectual constructs in the study of new ventures.

Performance construct consistency

Although the results of our investigation were largely consistent when we included and excluded subjective performance measures, we appreciate the greater issue of the inconsistency across studies in how performance is assessed. While all the studies we employ in our analysis introduce measurement of the construct of interest with respect to venture performance, virtually every one varies in the exact metric used to gauge performance, and also in the manner in which data are collected to operationalize that metric. The lack of agreement regarding performance measurement will hamper the development of literature in the field, constraining comparisons across predictor variables, industries and other constructs of interest. We appreciate that it is unlikely that a single measure will be appropriate for all situations (Griffin and Page, 1996), and hope that future research will at least compare the different measures of new-venture performance, specifically to determine the correlation between the various measures and recommend a subset of measures that researchers should focus on in order to ensure that results will be comparable across studies.

Suggestion 8: search out homogeneous dependent variables.

Rigorous reporting

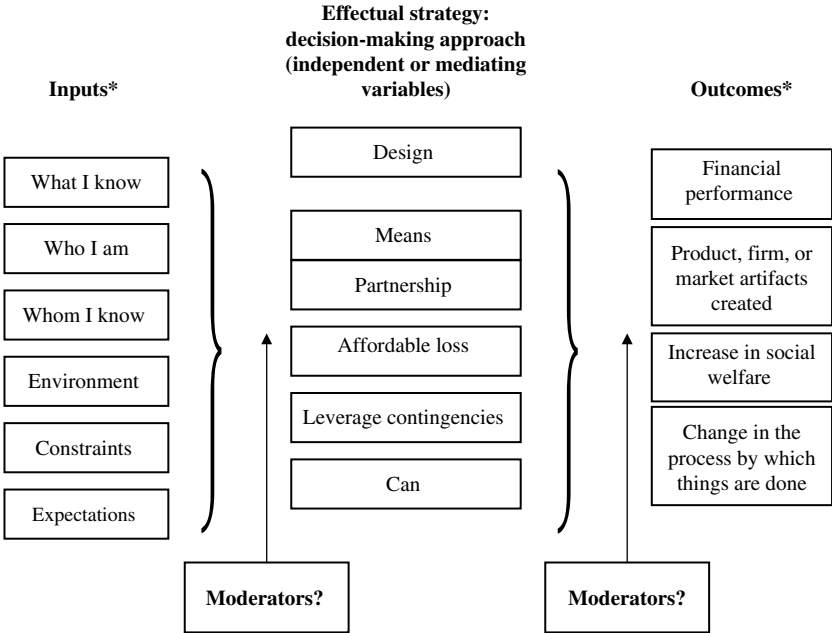
Correlation tables. In order to integrate research across studies, the necessary statistics must be reported in the publication so that they are accessible to future researchers. Our sample would have been significantly increased had all new venture researchers and editors diligently included correlation tables.

Suggestion 9 (for editors): set aside page space, if only in the appendix, for the necessary statistics, detailed descriptions of study design and listings of subjective item measures, so that results can be integrated into future research.

12.2.5 General Model

We complement our suggestions for the implementation of future research with the proposal of a general model that may facilitate study design for future investigation of effectual approaches. Our model is presented in Figure 12.2.

With a view to discussing the measurable constructs within an effectual logic we present antecedents and outcomes in the general model to aid in developing an empirical understanding of the relationships that might initiate an effectual approach, as well as the results we might expect from one.



Note: * The lists of inputs and outcomes are not complete, but rather provide representative examples to stimulate future research.

Figure 12.2 General model for future research

For example, in Suggestion 2 we noted that availability of means does not guarantee an effectual strategy that incorporates a means-oriented approach (as opposed to a goals-oriented approach). Means, in some combinations and quantities, may even inhibit an effectual strategy. One insight that is clarified by the general model is that the use of an effectual strategy may be guided by available means and that the relationship may even be moderated by environmental, psychological or other variables. Further, an effectual strategy may even mediate the main effect of resources on outcomes such as performance and creation of artifacts. Future efforts can examine these relationships in more detail, and the general model aspires to provide a starting point.

Study design

Closing this essay with as much specific data as we could imagine that might aid future research, we examined the studies we included in our meta-analysis to report the descriptive statistics of what designs were used,

how data were collected, and what statistical tools were employed. Our findings are presented in Figures 12.3a–d.

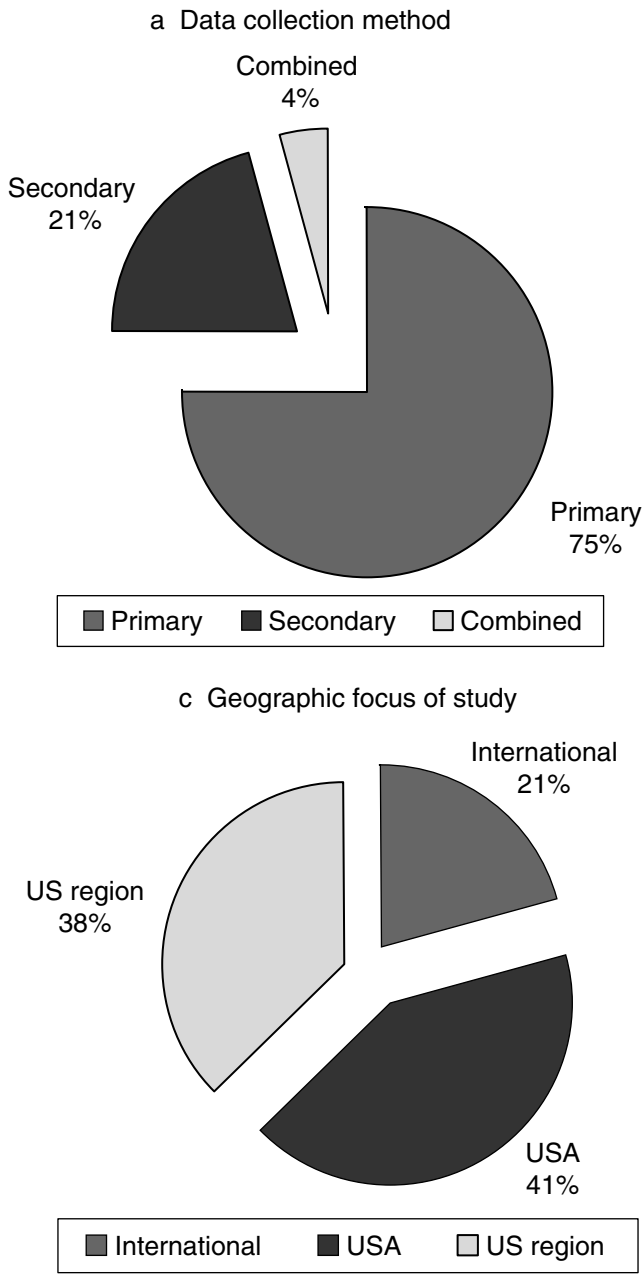
Figure 12.3a describes the method by which data were collected for the studies included in our meta-analysis. We were not surprised to see that 75 per cent of the studies collected primary data. All but one of the primary data collection studies used a survey instrument (the remaining study employed a case and interview method), underscoring the need to develop clean measures for each of the six effectual principles. Secondary data came largely from SEC filings of firms preparing for public offerings.

Figure 12.3b reports whether investigators focused the study on a particular industry or group of industries, or whether the study was distributed across a more general population. We were pleasantly surprised to find that a majority of studies were designed around a particular industry focus, as we highlight the context sensitivity of both expertise and effectual constructs. Figure 12.3c describes the geographic focus of the studies in our meta-analysis. Having a reasonably evenly balanced set of international, focused domestic US regional and broad US studies provides good cross-validation for our meta-analysis and fuels a suggestion for study design that we discuss in the next paragraph. Figure 12.3d shows that regression is the overwhelming choice of statistical analysis tool employed by researchers whose studies were included in our meta-analysis.

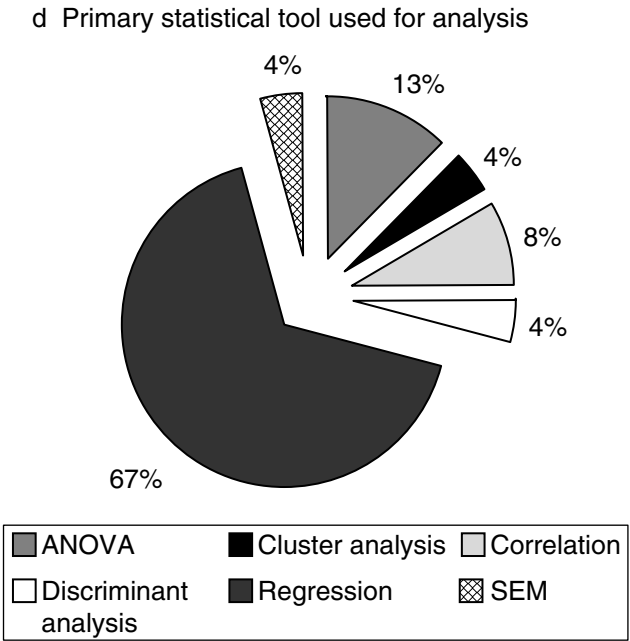
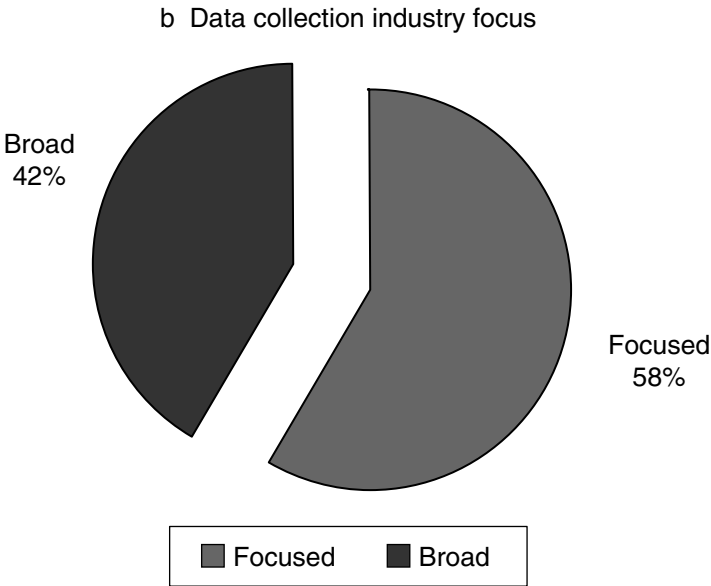
These findings give us insight into how new-venture research has been conducted to date and lead us to suggest some alternative approaches. We note with interest that little work has compared differences between two specific groups. This may be an artifact of entrepreneurship research evolving from the strategy discipline, but limits the potential for insights into strategy making. Comparing differences (using matched-sample, ANOVA-type designs) across geographies, expertise levels, industries and initial resource levels may shed new light onto both the antecedents and outcomes associated with an effectual approach. Additionally, we note the lack of a single paper in our sample that employs econometric modeling techniques. We have already advocated the use of experimental economics techniques in the investigation of a strategy of affordable loss and broaden our suggestion here to include particularly the use of time-series modeling, which may shed light onto the causality of the relationships we present in the general model.

In closing

Building an understanding of the core strategies associated with effectuation in the context of the inputs that may shape an effectual approach, and using those variables to investigate a variety of the different



Figures 12.3 Descriptive statistics for study designs from meta-analysis



Figures 12.3 (continued)

types of outcomes effectuation is designed to influence, may provide foundational information about how entrepreneurs are made, how entrepreneurs can be taught, and how to apply these core strategic differences to problems that range from finance to homelessness.

12.3 ROBERT WILTBANK ON EFFECTUATION AND PRIVATE EQUITY INVESTING

My primary interest with effectuation has been to look more closely at its consequences. Is it a good idea to pursue opportunities in an effectual fashion? This question, like any performance-related question, is challenging. While we are going about this through several different methods, here I will discuss my research with early-stage equity investors. I chose this area for two reasons. First, angel investors make significant decisions in the face of extreme uncertainty, so I expected that if effectuation could have outcome effects we should be able to find them in the setting of private equity investing. Second, virtually no data exist on angel investors, especially on their performance, so it is a great opportunity to create information that simply doesn't exist.

As a result, over the last two years I have been mapping this space in more detail, relating decision making in early-stage equity investing to entrepreneurial decision making. In particular, we have begun breaking down causal and effectual logics in private equity decision-making to their more testable elements of predictive and non-predictive control. The following is a summary of this ongoing research.

12.3.1 Angel Investing – an Introduction

Informal venture capital – angel investing – exists at the intersection of two interesting areas: equity investing and entrepreneurship. While it is likely a mix of both fields, the current state of the art in angel investing research primarily represents an investing perspective, drawing almost exclusively on research into formal venture capital. The bulk of formal venture capital research, in turn, is informed by principles from large market practices in capital markets and corporate finance. Primary theoretical frames such as information asymmetry, agency theory and portfolio concepts are used to explain aspects of formal VC practice as well as the structure of the VC industry itself.

By way of introduction, angel investors are wealthy individuals who privately invest their own money into new ventures. They tend to make smaller investments in very early-stage companies, often become significantly

involved in the direction and operation of those ventures, and operate outside the regulations of the VC industry. The early-stage ventures in which they invest often have very flexible business models and are still developing their knowledge of potential markets. Entrepreneurs at this stage have virtually no track record with their organization and often make changes in their operation that target completely different markets than planned, possibly creating entirely new markets. The setting presents fundamental challenges to predictive efforts for deciding how to proceed and increases the possible usefulness of effectual approaches for moving forward.

Surprisingly little is known about angel investors, an unfortunate fact given their central role in early-stage ventures. In dollar terms, angel investing is at least as large as the entire VC industry. In 2004, the Center for Venture Research estimated that approximately \$22 billion was invested by angels, the same amount invested by formal venture capitalists. The Global Entrepreneurship Monitor study provides data not only of angel investor groups but also the broader population of angels. This data set implies an angel investing market of over \$30 billion in that same year. (They found a total of \$64 billion in informal new venture investments; I exclude 52 per cent of that number, which resulted from family and friends, to reach the \$30 billion.)

In addition, angel investors put over 30 per cent of their money into extremely young seed-stage opportunities (versus only 2 per cent from formal venture capitalists). Using the smaller market estimate of \$22 billion, angel investors' early-stage focus translates to over \$6 billion going to seed-stage ventures, compared with only \$330 million from venture capitalists in 2004. These angel investments are spread over more than 20 times the number of ventures as investments made by formal venture capitalists. The primary early-stage equity providers today are unquestionably angel investors, yet we know little about how they operate in such a highly uncertain situation, and we know even less about the outcomes of their efforts.

From early research, we do know that angels typically invest \$25 000 to \$500 000 in any individual opportunity, whereas \$1 million is a small investment for a VC firm. Smaller investment opportunities are primarily available in earlier-stage ventures, where there is also a shorter track record upon which the investor can base decisions (Freear et al., 1995). Formal venture capitalists invest in somewhat later-stage deals in order to place larger amounts of capital, and they proactively seek out investment opportunities through a more deliberate professional network (Gompers and Lerner, 1999). On the other hand, angel investors mainly rely on a personal network of contacts and may not seek out new deals as proactively (Amis and Stevenson, 2001).

Extant research into venture capital investing has established that formal venture capital practices focus on: (1) moderate to late stages of new-venture development; (2) extensive due diligence; (3) improving deal flow; (4) developing co-investor relationships; (5) owning controlling interests; and (6) leveraging incentive systems in motivating entrepreneurs. Theorists argue that each of these practices is geared toward reducing agency risks, reducing adverse selection and moral hazard problems, and pursuing some extent of diversification (Kaplan and Stromberg, 2001; Sapienza and Gupta, 1994; Triantis, 2001). As Lerner (1995, 1998) and Fenn and Liang (1998; Fenn et al., 1997) document, venture capitalists incur considerable costs in search and selection and then underwrite significant efforts in developing and administering mechanisms that overcome potential agency problems and monitor the performance of each investment in the portfolio. The expectation is that these practices allow investors to hold a set of investments in which the risk of failure is significantly reduced and to select new ventures that are most likely to earn high returns.

What research there is that looks at the practices of angel investors suggests that angel investors often use significantly less of the formal VC practices outlined above. Prowse (1998) points out that angel investors focus their investments in earlier stages of venture development, do significantly less due diligence, source deals very locally through personal networks, do not have comparable levels of portfolio diversification (if any at all), rarely take positions of controlling interest, and regularly avoid detailed contracts and incentive schemes.

These earlier-stage opportunities are regularly considered to present a higher risk of failure given their newness (Amis and Stevenson, 2001; Shepherd et al., 2000) to be subject to higher risks from information asymmetries (Triantis, 2001). As a result, many angels look for previous personal knowledge of the entrepreneur and consider business plans and forecasts secondary to their own knowledge about proposals and comfort levels with the entrepreneur. In fact, angels routinely reject 'promising' proposals due to a lack of firsthand knowledge of the venture concept and/or the principals involved (Prowse, 1998).

In a recent empirical study of angel investors, Mason and Harrison (2002) contrast angels and venture capitalists in terms of their approaches to investment appraisal, due diligence and contracting as follows: business angels are less concerned with financial projections and are less likely to calculate rates of return. They do less detailed due diligence, have fewer meetings with entrepreneurs, are less likely to follow up references on the entrepreneur and to consult other people about the investment. Conversely, business angels are more likely to invest on 'gut feeling'.

Table 12.4 *Overcoming risk: formal venture capital practices*

Theoretical frame	Formal VC practice
Agency theory	Involved contracts and incentives Financial commitments and reporting Management recruiting
Adverse selection and info asymmetry	Later stages of venture development Extensive due diligence research High deal flow to improve 'probabilities'
Moral hazards and opportunism	Extensive due diligence research Later stages of venture development Controlling positions, control rights
Portfolio diversification	Co-investment relationships Industry specialization, venture interactions

From an equity-investing perspective, it seems that angels make investments that are at much greater risk of failure than the firms in which venture capitalists invest. In each category of practice for dealing with the theoretical risks of private equity investing (as laid out in Table 12.4), angel investors are on the riskier end of the spectrum. At the same time, however, the only published empirical research comparing the return distributions of formal venture capitalists and angel investors finds that angel investors fail significantly less. Mason and Harrison (2002) study angel investing outcomes in the UK and compare their results with those of Murray (1999) on venture capital outcomes. These studies show that angels failed (exit at a loss) approximately 40 per cent of the time, compared with nearly 65 per cent for formal venture capitalists.

The combination of these ideas, that angel investors seem significantly more at risk than formal VCs yet fail less, suggests to us the potential for exploring a more entrepreneurial perspective of angel investing. In particular, we argue that in situations of extreme uncertainty, focusing on agency risks, adverse selection, moral hazard and diversification may interfere with effectual principles often employed by expert entrepreneurs in the creation of new firms and markets. This is in line with the fact that angel investors are often themselves former entrepreneurs.

A significant assumption in this venture capital perspective is that a key source of uncertainty arises from investors' information disadvantages with regard to the entrepreneur's private information about their ability and motivation to succeed. Decision-making based on effectual logic would contend, however, that the entrepreneur faces these same doubts – that is,

they have little if any advantage in terms of private information about their ability and motivation to succeed. This setting requires us to consider situations where not only the investor but also the entrepreneur is unable to predict his or her own product-market success. When the size, quality and nature of an opportunity that may ultimately result from the process is unknown, we may find insights by recasting the investor–entrepreneur relationship in terms of a partnership for creating a valuable opportunity rather than as a setting for agency and information-related problems in dividing its expected returns.

12.3.2 The Primary Hypothesis

As explained in earlier chapters of this book, each of the key principles of an effectual logic is likely to reduce the failure of ventures in truly uncertain situations. Effectual action tends to reduce the costs of failure, reduce investment in making predictions, and keep entrepreneurs from getting locked in to predictions that turn out to be misguided. Existing evidence on angel investors, although fragmented and inadequate, does suggest that they routinely use some of these key principles of effectuation and most often have significant entrepreneurial experience. Similarly, existing evidence on VCs suggests that they use a more causal predictive approach. This may be in line with the fact that VCs tend to be drawn from banking and finance backgrounds rather than from the pool of experienced entrepreneurs.

In fact, in light of the true uncertainty and endogeneity of outcomes in early-stage venture investing, formal VC practices may have unintended consequences that actually increase investment failure. Financial commitments and close monitoring prevent the venture from making large but potentially important changes in its business model. Complex contracts and incentive systems to cover agency risks may undermine a deeper advisory role that more effectively utilizes the investors' expertise to create new value with the entrepreneur. Similarly, holding a broad portfolio of investments may make it overwhelming to construct unanticipated new markets that leverage the collective imagination of the entrepreneur, the investor, and other key stakeholders.

Taken together, an effectual perspective on private equity investing implies a primary hypothesis for angel investor outcomes.

Hypothesis: Angel investors, to the extent that they emphasize the effectual logic of non-predictive control, will experience lower rates of investment failure than formal venture capital investors in early-stage equity investing.

Testable elements of the primary hypothesis

For the purposes of investigating the use of causal versus effectual logics in private equity investment, my collaborators and I first broke them down to more testable elements, which we then embodied in a survey instrument. The instrument was then used to study the relationship between decision-making strategies and the returns of angel investors. This same instrument is currently being used to investigate formal venture capital returns as well. We broke that main hypothesis into four more specific and testable hypotheses. The first looks at the effects of emphasizing non-predictive control, particularly in regard to focusing more on means than on goals, and using affordable loss as a decision criterion.

Affordable loss suggests that the venture decide what to do next by pursuing efforts that consume minimal resources and iteratively refining the business model. This is significantly different than creating a plan based on our best estimate of the future and investing in the resources necessary to achieve that plan, and it minimizes exposure to prediction error. The affordable-loss principle of effectuation is characterized by three heuristics. First, invest only to the extent you can survive complete loss. Secondly, imagine creative ways to get things done with zero resources. Thirdly, work up from the cheapest to the highest-cost options – that is, do not buy what you can rent, do not rent what you can borrow, do not borrow what you can get for free (Sarasvathy, 2001). Affordable loss provides a non-predictive decision criterion in that it doesn't require that expected returns be forecast as the basis for decision, and it is completely controllable given that the investor can invest only to a certain limit.

Secondly, the adaptation of goals rather than means focuses entrepreneurs on executing with their real and present capabilities, rather than searching for and acquiring the 'proper' set of means for achieving a predetermined goal. Additionally, creating new goals is less expensive than acquiring new means; thus a primary commitment to transform means into interesting goals helps the venture avoid consuming its resources. Finally, in the uncertain setting of early-stage ventures, it is not clear how to achieve specific goals, which leads to investments in means that often turn out to be unrelated to success. In more stable settings, commitment to a specific goal may help clarify next steps (such as what means to gather and actions to take); in uncertain settings, a commitment to means may guide action more effectively by inspiring new ends that leverage the venture's resources and capabilities.

These aspects of non-predictive control reduce the failure rate of new ventures. Affordable loss extends the life of the venture by stretching its resources. A commitment to means maintains flexibility and encourages the venture to focus on current capabilities and find new ways to create saleable products with those capabilities. As angel investors with a greater emphasis on non-predictive

control select ventures that work on these principles and encourage them to make strategic moves with an eye toward proactively controlling their future, they are likely to reduce significantly their investment failures.

Hypothesis 1: Investors with a greater emphasis on control will experience fewer failures.

Whereas control is expected to reduce the frequency of investment failures, prediction is expected to have the opposite effect, increasing failure in new ventures. Forecasting in early-stage venture investing is particularly challenging given the high level of uncertainty. Investors who select and develop new ventures focusing on effectively positioning themselves for specific forecasts put themselves in a precarious position. Significant investments are required in order to position the firm for those forecasts (for example, in personnel, marketing and operational systems). Ventures committed to a predictive plan and investing in the required resources are more likely to fail if those predictions turn out to be significantly misguided (Ghemawat, 1999). Rather than focusing on quick positive cash flows, the focus is on optimal positioning, which can involve significant extensions of resources over long periods.

Additionally, predictive strategies with commitments to specific goals and targets are prone to escalation of commitment, especially when the predicted payoffs are large (Ryan, 1995). This is in line with research on planning, which shows the negative impact of predictive planning efforts on organizations in uncertain environments (Fredrickson and Iaquinto, 1989; Fredrickson and Mitchell, 1984; Hough and White, 2003). The combination of high-expense structures and difficulty in correcting course even when predictions turn out to be incorrect suggests that emphasizing prediction in very early-stage new ventures may lead to more failures.

Hypothesis 2: Investors with a greater emphasis on prediction will experience more failures.

While failure may be more frequent with a predictive approach, when predictions guiding a new venture turn out to be correct, the venture will likely outperform other players. By positioning in relation to accurate predictions, the venture may have several strategic advantages, specifically created for the competitive situation in which it finds itself. It is able to acquire valuable resources at a discount to their value in the new situation: people, locations and customer relationships, for example. Also, it may provide larger companies and investors an option to buy their way into that new and now less risky opportunity, in addition to opportunities for public market

investors to invest in a possible IPO. These factors greatly enhance the possibilities for investors in the venture to earn large returns. It is important to point out that investor strategies premised on prediction often deliberately leverage the skewness of returns, where most new ventures make small losses but a few make substantial returns. While prediction may involve committing to next steps that fail more frequently, investors likely expect the frequency of major successes to offset the losses of failure.

Hypothesis 3: Investors with a greater emphasis on prediction will experience bigger successes.

The effect of emphasizing control on the frequency of success is less clear; empirical research relating to this concept is simply not far enough along. On the one hand, control efforts may limit an investor's ability to achieve major returns because he or she tends to underinvest in opportunities by focusing on affordable loss, and may constrain opportunity pursuit through the commitment to means rather than goals. Additionally, next steps are anchored around what can be done to influence the future, rather than on what should be done to maximize returns. On the other hand, emphasizing control may increase major returns as control strategies focus on creating new market space and creating critical market elements that can result in very large successes rather than small increments in existing market spaces (Kim and Mauborgne, 1997). Additionally, there is some work showing that a clear vision of how a venture will create a market can result in considerable market value and even market leadership (Collins and Porras, 1994; Tellis et al., 2001).

Finally, the magnitude of success and failure is likely to be different because investors approach the selection and development of new ventures with different prediction and control approaches. A critical element of this stems from the role of affordable-loss decision making in control approaches rather than maximizing expected values in predictive approaches. In the latter, investments are made in order to position the venture to hit predictions, and often the overhead of a venture grows in advance of the opportunity. With affordable loss, overhead is systematically lower, generally trailing the realization of the opportunity. In the event that an opportunity collapses, the magnitude of loss will likely be smaller.

Additionally, control approaches often involve working with more partners to co-create a market and grow from a commitment to leverage current means rather than acquire the means required to achieve a prespecified goal. In the first case, strategic suppliers, committed customers and other market participants spread the investment in an opportunity across more stakeholders. This reduces the magnitude of loss to any one investor. In the second, the cost of

acquiring new means and resources is simply avoided, making the opportunities less expensive. In combination, making affordable-loss investments across more stakeholders results in opportunities that grow out of current means is likely to reduce the magnitude of losses when they do occur.

Hypothesis 4: Investors with a greater emphasis on control will experience smaller losses than investors who emphasize predictive strategies.

As investors emphasize control in their selection and development of new ventures, they will likely experience fewer failed investments. Alternatively, as they emphasize prediction, they will likely have more extreme outcomes, more failures and more large successes. Finally, when looking at the magnitude of the investments, an emphasis on control rather than prediction will result in smaller losses. The next section tests these hypotheses using the first data set of individual angel investor outcomes in the USA.

12.3.3 Methods and Measures

Over the past two years we have made countless phone calls and attended many conferences to develop relationships with directors of angel groups, and we have acquired a private list of investors in order to create a nationwide sample of 585 angel investors. The data in this study cover the activities of 106 angel investors reporting on 917 new-venture investments and 335 exits from those investments.

The process of study followed well-established protocol for survey research (Dillman, 2000). Initially, discussion and learning formed the survey, which was then fine-tuned through feedback from pilot testing and then used in large-scale data collection across the USA. Initial surveys were developed and discussed with ten angel investors, which ensured that the questions and method of response allowed them to report their experiences accurately. Data collection was then scaled up and expanded geographically.

The majority of the sample (75 per cent) was reached in cooperation with angel investor groups. Contact was made through the endorsement and involvement of the groups' directors, who handled communication with individual members, keeping contact information strictly private. The bulk of the data relate to investments over the past 10 years (90 per cent of the sample), with the oldest investment reported in 1985. The remainder of the sample (25 per cent) was reached through a survey sent to 150 members of an online investment network named NVST, a national forum connecting investors and entrepreneurs. The number of respondents to the survey from both sources was 106, giving an overall response rate of 18 per cent. While a higher per centage is of course more desirable, this is on par with prior

work with venture capital investors (Gifford, 1997; Ruhnka et al., 1992; Sapienza and Gupta, 1994). For more details on sampling issues, corrective procedures, robustness of the instrument, limitations and data analysis, see Wiltbank et al. (2005). Here we shall leap directly to the results of the regression analysis, which involved the following variables.

Independent variable measures

Prediction and control scores are calculated as the sum of an investor's responses (1 through 7) to items on the survey regarding his or her use of prediction and control in a new-venture-development scenario. The sum was divided by the total possible score (42 for the six prediction items, and 56 for the eight control items).

In order to claim that these concepts of prediction and control are useful, we must be able to improve our ability to explain angel-investing outcomes beyond the concepts identified in existing research on new-venture investing. To do this, we created a baseline of factors, based primarily on the results of research with formal venture capitalists. This baseline model accounts for the context in which this study takes place and provides a strong test for considering the added value of the ideas developed in this chapter. The baseline model includes:

- *Total venture investments* is the total number of investments an investor has made and represents a control for overall activity to standardize the number of exits in each category.
- *Investment experience* is measured as the number of years over which the respondent has been investing in new ventures.
- *Entrepreneurial experience* is measured as the number of years over which the respondent worked as an entrepreneur.
- *Seed stage* captures the extent to which the respondent concentrates investments in early stages of new-venture development. It is measured as the number of a respondent's investments made in seed-stage opportunities rather than the other stages of development. Seed, startup, early growth, late growth and buyouts are standard categories in new-venture investing.
- *Due diligence effort* captures the extent to which the investor emphasizes up-front research into the prospects for the new venture. Due diligence is measured by the total number of hours that the investor spends investigating the entrepreneur's references and the venture's market, customers and operation.
- *Deals through personal relationships* is measured as the respondent's report of the number of investments that came from various sources. We measure the number of investments where the investor had a

personal relationship with the entrepreneur, either as friends, having previously worked together, or from a referral through a friend. These personal relationships contrast with more professional/pragmatic sources where the entrepreneur was referred to the investor through professional contacts, or the deal resulted from the investor's participation with an investment group.

- *Prior investors* in a new venture provide additional support and insight into the potential of the venture. Investors vary in the extent to which they go in on their own or with other investors. This is measured as the number of a respondent's investments in which there were earlier investors.
- *Participation*, post investment, gives the investor an opportunity to add value to a venture beyond just a cash infusion. This is measured as the percentage of investing time spent with ventures in which the investor has already made an investment.

Dependent variables

We measured outcomes in categories of internal rate of return (IRR) achieved at each exit. Using IRR categories allows for a margin of error in the details of IRR calculation but still allows us to evaluate the distribution of an investor's returns. This is in line with the method used in the only other study reporting outcomes for individual angel investors, by Mason and Harrison (2002). In this sample there were 335 exits.

- *Homerun* is the number of investment exits where the investor achieved greater than 100 per cent internal rate of return.
- *Negative IRR* is the number of investment exits where the investor achieved a negative internal rate of return.

12.3.4 Results

Table 12.5 shows descriptive statistics for the measures, followed by the correlations in Table 12.6. Regression models exploring each of the dependent measures are shown in Table 12.7.

The following explains the results of the study, grouped into two sections: the baseline model of the investor perspective, followed by the results for the measures of prediction and control.

Baseline model

The set of investing variables in the baseline model establishes a context within which we can consider the incremental impact of an investor's prediction and control emphasis. Table 12.7 shows the effects for activity,

Table 12.5 Descriptives of private equity investors' survey

Variable	Valid N	Mean	Median	S.d.	Min.	Max.
Venture investments	102	8.9	7.0	8.0	1.0	50.0
Investing experience	102	9.9	8.0	7.5	1.0	35.0
Entrepreneurial experience	102	13.6	10.5	11.3	0.0	50.0
Seed stage	101	2.6	2.0	3.1	0.0	15.0
Due diligence	92	49.0	27.5	57.4	1.0	320.0
Personal relationships	102	4.4	2.0	5.7	0.0	35.0
Prior investors	97	5.4	3.0	5.6	0.0	30.0
Participation	100	30.2	20.0	31.2	0.0	100.0
Prediction emphasis	100	0.8	0.8	0.1	0.4	1.0
Construction emphasis	100	0.7	0.7	0.1	0.1	1.0
Exits with negative IRR	102	2.0	1.0	4.2	0.0	25.0
Exits with over 100% IRR	102	0.6	0.0	1.0	0.0	5.0
Perceived failed	102	2.3	1.0	3.1	0.0	19.0
Perceived successful	102	2.1	2.0	2.2	0.0	11.0

Note: Log corrections were made to experience variables, due diligence, and time with existing investments.

experience (investing and entrepreneurial), and a broad set of variables that are expected to be important in new-venture investing. In this baseline model, few of the variables have an impact on exits over 100 per cent IRR, but several impact exits at a loss. Two variables appear to make angel investor exits more extreme. Entrepreneurial experience and investing with prior investors significantly increase the > 100 per cent and negative exits. Additionally, angel investors who make more of their investments in the seed stage, rather than startup and later stages, actually experienced significantly fewer negative exits, which is somewhat surprising. Lastly, investors who made more of their investments through personal relationships experienced significantly more negative exits.

Prediction and control

The baseline model against negative exits reaches an adjusted R squared of 0.62, showing that seed-stage investments, investing through more personal

Table 12.6 Correlations for private equity investors' survey

Variable	Vent. invts	Inv. exp.	Ent. exp.	Seed stage	Due dilig.	Pers. rels	Prior. invts	Participation	Prediction	Construct.	-ve IRR	>100 IRR	Failed	Successful
Experience	Venture investments	1.00												
	Investing experience	0.35	1.00											
	Entrepreneurial experience	0.20	0.47	1.00										
Seed stage	Seed stage	0.64	0.34	0.15	1.00									
	Due diligence	0.15	0.16	0.05	0.35	1.00								
	Personal relationships	0.66	0.38	0.15	0.68	0.14	1.00							
	Prior investors	0.70	0.24	0.17	0.45	0.09	0.56	1.00						
	Participation	0.20	0.07	(0.01)	0.24	0.23	0.03	(0.01)	1.00					
Approach	Prediction emphasis	0.19	0.01	0.03	(0.01)	0.07	(0.14)	(0.12)	0.04	1.00				
	Construction emphasis	(0.13)	(0.13)	(0.06)	(0.20)	(0.11)	(0.05)	(0.13)	0.02	(0.20)	1.00			
Exit outcomes	Exits with negative IRR	0.50	0.29	0.23	0.39	0.13	0.67	0.69	(0.01)	(0.07)	(0.22)	1.00		
	Exits with >100% IRR	0.52	0.36	0.27	0.39	0.20	0.51	0.59	0.00	(0.08)	(0.20)	0.74	1.00	
Perceived outcomes	Failed	0.63	0.37	0.28	0.57	0.18	0.53	0.57	0.06	0.07	(0.30)	0.68	1.00	
	Successful	0.59	0.46	0.30	0.46	0.14	0.49	0.35	0.14	(0.01)	(0.08)	0.29	0.37	1.00

Table 12.7 Regression models of angel investor exits

	Exited with >100% IRR		Exited with negative IRR	
Constants	0.30	0.75	2.38	0.43
Venture investments	0.01	0.70	(0.06)	0.49
Investing experience	0.01	0.60	(0.01)	0.83
Entrepreneurial experience	0.02	0.08	0.07	0.03
Adjusted R ²		0.38		0.43
Seed stage	(0.03)	0.54	(0.38)	0.02
Due diligence	0.00	0.45	0.00	0.49
Personal relationships	0.04	0.23	0.46	0.00
Prior investors	0.08	0.00	0.39	0.00
Participation	(0.00)	0.90	0.00	0.95
Adjusted R ²		0.43		0.62
Prediction emphasis	(0.29)	0.72	0.52	0.84
Control emphasis	(0.65)	0.37	(5.84)	0.01
N		75.00		75.00
Adjusted R ²		0.42		0.65

sources, investing where other investors are already involved, and entrepreneurial experience are important factors. With this information, we can look specifically at the incremental effects of prediction and control approaches in angel investing.

Hypothesis 1 argued that angel investors with a greater control emphasis will experience fewer failures as they select and develop ventures that focus on creating and influencing important aspects of their market. This hypothesis is supported in Table 12.7, where a control emphasis is significantly related to a reduction in negative exits.

Hypothesis 2 relates an investor's emphasis on prediction to experiencing more failures, and, in *Hypothesis 3*, to experiencing more successes. Because of the challenges to prediction in early-stage ventures, an emphasis on prediction was expected to result in more frequent failures, but when predictions are on target, the venture should be well positioned for very successful exits rather than small successes. In Table 12.7, a prediction emphasis is not significantly related to exited outcomes in either direction, leaving Hypotheses 2 and 3 unsupported.

Hypothesis 4 argued that investors emphasizing control will experience smaller losses than investors emphasizing prediction. In Table 12.8, group differences (split on the mean of each measure) between investors who emphasize control and those who emphasize prediction show that a prediction emphasis results in significantly larger losses (\$410 000 versus \$137 000), and those who avoid prediction and emphasize control experience even smaller losses (\$86 000).

In relation to the baseline model, Table 12.7, prediction and control significantly increased adjusted R squared at the 0.05 level for the model of negative exits, increasing adjusted R squared to 0.65. This was primarily due to the impact of the measure of control. The robustness of these findings was tested in a number of ways, primarily through tests for collinearity and confirming the findings in split samples. None of the tolerance statistics was smaller than 0.5, where 0.2 is the threshold for concern, and the relationships of the variables to the dependent variables were stable through detailed stepwise regressions. Additionally, the results of the models are remarkably stable across subsamples of the overall sample, which we ran only with investors who had made three or more exits, then for investors with only seven years or more experience, then splitting the sample in two by even and odd number records, and finally by deleting the five highest and five lowest performers.

In total, emphasizing control – leveraging the principles of effectuation – significantly reduced failures for angel investors. These investors, however, experienced the same frequency of above 100 per cent IRR exits. This was contrary to the expectation that a prediction emphasis would increase the frequency of major successes, in exchange for increased failure rates to that approach. Additionally, a prediction emphasis significantly increased the magnitude of investment for angel investors.

12.3.5 Empirical Conclusions

As angel investors emphasized control strategies for dealing with uncertainty, their failures were significantly lower in their new-venture investments. Explaining success was more challenging. It is not clear whether this is a result of the size of the sample and the low frequency of success in angel investing, or if it is driven simply by a more stochastic occurrence of successes as opposed to failures. Seed-stage investments were actually related to fewer negative exits while making investments found primarily through personal relationships increases negative exits. Additionally, both entrepreneurial experience and making investments with other investors resulted in a more extreme distribution of outcomes, increasing both negative and homerun exits. Looking at

Table 12.8 Group differences on prediction and control in private equity investing

constructive		Predictive	Non-predictive	Constructive	Non-
Sample	No. in group	50	50	56	45
	No. of exits	136	199	143	192
	No. of investors with exits	30	32	31	31
Outcomes	% perceived as successful	0.29	0.28	0.28	0.29
	% perceived as failed	0.28	0.26	0.25	0.29
	Average IRR	0.28	13.18	23.19	(2.22)
	% of exits < 0% IRR	0.62	0.60	0.58	0.65
	% of exits > 100% IRR	0.16	0.19	0.20	0.16
Experience	\$s per investment	410 430	137 577	299 928	238 996
	Total investments	400	517	478	439
	Years investing	9.70	10.00	9.10	10.90
	Investments per investor per year	0.82	1.03	0.94	0.89
Investments	Years as entrepreneur	13.62	13.84	13.17	14.42
	% of deals in seed stage	0.32	0.36	0.31	0.37
	Hours of due diligence	54.20	43.50	46.80	51.90
	% from personal sources	0.49	0.54	0.56	0.45
	% with prior investors	0.63	0.56	0.60	0.59
	% of time with existing investments	33.40	26.10	30.40	29.10
Approach	Predictive %	0.89	0.68	0.76	0.82
	Constructive %	0.71	0.75	0.83	0.61

prediction and control significantly added to the explanatory power of the models.

12.3.6 Theoretical Conclusions

At this point, we propose three important conclusions. The first is that in an uncertain context, prediction is not related to positive outcomes; emphasizing prediction provided no advantage. This confirms many critiques of prediction, particularly in uncertain situations, though in a new setting. This is strongly argued by Rosenberg (1996b) and by other economists (Freeman and Perez, 1988) as well as management scholars (Mintzberg, 1994). The outstanding question is whether there is another proactive effort that can take the place of prediction, at least in part, in uncertain situations, or whether actors are simply left to adapt as uncertainty resolves. Effectuation moves us in that direction, suggesting we work to influence and control how uncertainty resolves. The empirical results of this study suggest that this can have important effects on failure without reducing major success.

Secondly, as this dimension of control develops, it may have interesting implications for population ecology and other areas where organizational change is considered less than effective. If actors/organizations in highly uncertain environments act to influence their environment, the selection and retention models of new entrants are significantly more complex. Rather than making an initial 'bet' on a business model in a given market, new-venture leaders emphasizing control may iteratively change their initial bet and the market itself. By influencing their own models *and* the selection criteria, which may be more feasible in particularly uncertain situations, they may significantly enhance their prospects of survival and possibly even performance.

Finally, these results suggest there may be no trade-off between effectual efforts to control/influence uncertainty and successes. While we hypothesized that control efforts would reduce failures, but also potentially lead to underinvestment in major successes, this wasn't the case empirically. This means that a non-predictive control approach such as effectuation may systematically create new value in uncertain situations. Through a reduction of failure, actors remain in the game, capturing additional chances for what may be a more random occurrence of success. In this sense, control strategies are superior in an uncertain environment. There is of course a remaining question regarding the costs of these benefits. If there truly is no 'free lunch', then in what way are actors paying for these benefits? Potentially, it may be in the allocation of the rewards over more players, as control approaches may systematically leverage more partners. Alternatively,

perhaps the view of opportunity costs in the 'no free lunch' tradition is simply off target in situations that only come to fruition through creative human action. That is, we may need to reconsider opportunity costs and trade-offs when operating in Knightian uncertainty.

While this is an initial look at effectuation, particularly non-predictive control, in a quantitative sense, there is an enormous amount of work to be done to address three critical questions. What are the tactics and nuances that actors engage in as they develop an opportunity effectually? What are the performance outcomes of these efforts? And to what extent are these consequences contingent on the interplay of uncertainty and their expertise in effectual principles? We are now working with novice and expert entrepreneurs, formal venture capitalists and larger-firm managers to continue to hunt down answers to these questions. For now, this work with angel investors constitutes the first empirical data on the outcomes of effectuation and suggests that effectuation, working to create one of many possible futures rather than positioning for a probable one, may well present new opportunities for actors in truly uncertain situations.

NOTE

1. I gratefully acknowledge the contribution of Michael Song to my work on relating effectuation to new-venture performance through a meta-analytic study. My use of the plural 'we' or 'our' refers to him. He has co-authored a fuller version of this section with me in a journal article (Read and Song, 2005).

13. New research ventures

It is very tempting to end the book by reiterating what I set out to do and describing all that I have done. But I will resist the temptation and instead focus on what I have not done at all and/or not done well, and try to sketch a glimpse of possible new ventures.

13.1 UNANSWERED QUESTIONS

13.1.1 SpaceShipOne

I have not done an in-depth investigation of SpaceShipOne or written a detailed case study that answers the issues I raised in the first chapter. But I suspect it is only a matter of time before someone writes a good history of that venture. When that history does get written, here are a few specific questions I would like to put to the data in order to test the numerous competing hypotheses already discussed:

- When and how did Burt Rutan arrive at the decision to design space-ships? Was it before or after he began to perceive a market for space tourism?
- Did Rutan get in touch with Paul Allen for funding SpaceShipOne, or did Allen call Rutan? Did they know each other before? How did they meet?
- How exactly did they decide to partner on this venture? When did lawyers and contractual terms enter the picture? Assuming there was a written contract, how did they settle upon a value for the project? How were ownership and control structured in the contract?
- In the chronological map of key events in the development of SpaceShipOne, how many would we classify as search and selection events and how many were transformations of extant realities? What did the dominant pattern look like?
- Besides Rutan and Allen, who are the key stakeholders in the project? How did each of these come on board – were they sought by the original founders or did they self-select into the project? How exactly are

changes in the design of SpaceShipOne correlated with changes in stakeholder membership?

- What kinds of competitive threats did Rutan and his team analyse? How much of their resources (time and effort) were spent in such competitive analyses and how much in building the stakeholder network?
- What unexpected events caused changes in the resources, goals, design directions, and changing mix of stakeholders? How exactly did the team respond to each of these contingencies?
- What were the major failures and successes in the history of the project up to the point of completing the historical flight on 21 June 2004?

I readily admit that these are rather baroque details and perhaps not easily accessible. But I believe in-depth case histories are an absolute must if we are to develop truly useful theories that push beyond the frontiers of our understanding today, not to mention the potential of such case studies for pedagogy and practice. Simon (1998: 259) made a similar case when he argued that economics is a historical science:

For all of these and the other reasons adduced in this paper, economic science has and will continue to have an important historical component. Economic historians have been perhaps too modest in recent times about the role they have to play in establishing our economic knowledge. Their task is much more than one of explaining historical events in terms of an independently derived body of economic theory. It is much more than one of testing a theory that has already been formulated. The data assembled and analysed by historians is, in fact, essential for our understanding economic behavior and formulating empirically valid economic laws, including mechanisms that continually alter these laws with the changing knowledge, beliefs, perceptions, values and identifications of the human economic actors.

13.1.2 General Empirical Questions

The specific questions pertaining to SpaceShipOne represent more general problems of empirical interest to researchers and entrepreneurs. These problems comprise the content of that 'judgment' under uncertainty and lack of knowledge that Knight, Hayek, Shackle and others have urged us to grapple with. Moreover, every practicing entrepreneur must, consciously or not, sort out some or all of the following aspects of that judgment:

- What is controllable and what is outside one's control.
- Which opportunities are out there to be discovered, and which have to be fabricated – if so, how and when.

- When and how much to invest in predictions, and when to ignore them.
- How much to persist in one's own vision, how much to impose one's will, and how much docility and flexibility to bring to one's actions and reactions.
- When to go out and 'sell' high-potential stakeholders on coming on board and when and how to work with self-selected stakeholders.
- Under what circumstances and how to make the transition from an effectual to a causal logic.
- How and to what extent to concurrently keep causal and effectual approaches as the new venture grows.
- Whether, when, and how to implement an effectual logic in large corporations and bureaucracies.

13.1.3 Underdeveloped Links to Other Research

Several of the ideas in the book have conceptual links to and implications for work by others in related areas, some of which I have tried to explore in some depth, and others which I have either overlooked or touched upon only tangentially. Although a comprehensive list may be outside the scope of this attempt, some connections may still be worth an explicit mention. For example, there is a variety of sub-topics in evolutionary economics, such as the dynamics of market forms, path dependency, etc., that can help develop concepts related to effectuation. In particular, relationships to key ideas such as Murmann et al.'s (2003b) work on co-evolution are yet to be explored.

There are also promising connections to several topics in Austrian economics (Earl, 2003; Langlois and Cosgel, 1993) as well as the evolution of consumer preferences and consumption technologies (Earl and Potts, 2004; Lancaster, 1971).

Links also need to be developed to social movements theory (McCarthy and Zald, 1977) and work involving social networks. Notably, effectuation could benefit from and contribute to works such as Hargadon's (2003) explication of how breakthroughs happen. There is also a developing area of social philosophy based on the writings of pragmatists that may be worth some attention.

Some psychological theories such as Sternberg's (Sternberg, 2003, 2004) work on creativity and practical intelligence and Frese's (Frese, 1997) work on personal initiative etc., are likely important in fleshing out some aspects of effectual logic. Effectuation also has overlaps with the work of economists and game theorists engaged in modeling individual behavior that influences the probabilities of outcomes (Brandenburger, 1992; Jensen and Thursby, 2001).

13.1.4 Links to Policy

I made a conscious choice not to work out any policy implications for the ideas in this book, mostly because I believe more work needs to be done in thinking through prescriptive issues. But I suspect that an effectual logic would be in harmony with the policy positions of economists such as Mancur Olson and Amartya Sen. I will outline a few possibilities along this line of thinking in the next section.

There is, however, one specific area where policy-driven initiatives might be able to make a real contribution. That is the area of data collection. Currently, almost all available data pertain to firms and are geared to tracking firm performance. To begin to develop an economics that realistically incorporates what is interesting about entrepreneurship, we need to collect data on habitual entrepreneurs and how they outlive and manage failed firms. This means we need to track the careers of entrepreneurs as well as the life cycles of firms.

Another important issue for useful policy analysis on topics related to effectual entrepreneurship involves assumptions about where economic opportunities come from. As I discussed in Chapter 8, as long as we believe that opportunities are created through infrastructure such as incubators and technology parks, we will continue trying to ‘incentivize’ entrepreneurs to invest in predetermined opportunities and ‘channel’ their energies into particular geographic and technological spaces. Effectual logic suggests that by focusing exclusively on such measures, we may be overlooking new opportunities that are actually being created by local entrepreneurs, opportunities that could not be predicted or predetermined by think tanks or policy pundits. Instead, in addition to causal initiatives that may be working well, it might help us to think through alternative avenues that might facilitate and leverage these local and contingent efforts by effectual entrepreneurs.

Shane (2003) identifies three sources of entrepreneurial opportunities: technological, political/regulatory, and social/demographic changes. One interesting research question is the role of entrepreneurial action in creating some of these changes. SpaceShipOne is an obvious example of entrepreneurs pushing the frontiers of technological change; and entrepreneurs, individually and collectively, do seek to influence regulatory changes (Burris, 2001). With a little imagination we can trace the entrepreneurial thumbprint even in the case of social and demographic changes.

The role of firm failures and failure management in successful entrepreneurship would also be an important area for policy research. Almost every government on earth is engaged in providing seed money in one way or another for entrepreneurs. Currently, there is a strong anti-failure bias in

these programs, and there simply is no systematic attempt to manage or leverage failures as an integral part of successful entrepreneurship. This matter is again related to the paucity of data on entrepreneurial careers. For example, let us say an econometric study of habitual entrepreneurs finds that entrepreneurs with one or more early failures have a higher probability of succeeding down the road and creating larger ventures. We might then find it useful to develop financial instruments (some form of insurance, say) that help mitigate, manage and even leverage failure-related information. Denrell and March (2001) made a compelling argument against the error of rejecting alternatives that may initially appear worse than they actually are. In their argument, the very adaptive processes that lead to success may preclude us from investing in potentially good projects based on inadequate initial evidence consisting of failures. A deeper understanding of failures can both benefit and be benefited by policy research.

At the end of my journey, I seem to be left with many more questions than answers. Perhaps that is just as well. In the next section, I outline intellectual possibilities for a variety of stakeholders who I hope will self-select into the process of trying to answer some of these and to develop the ideas sketched out in this book.

13.2 NEW RESEARCH VENTURES

Entrepreneurship is a veritable inkblot in the history of ideas. The following, therefore, is by no means a comprehensive list. In outlining possible research ventures, I confine myself to possibilities closely tied to an effectual logic.

13.2.1 For the Philosophically Minded: Beyond Subjective and Objective

The subjective–objective dichotomy is very pertinent to several scholars in entrepreneurship today. Take, for example, the debate about whether opportunities exist out there in the world or only in the perceptions of entrepreneurs. Luckily, recent developments in the philosophy of knowledge speak to our concerns in interesting ways. I am particularly intrigued by Davidson's (2001) work on the myth of the subjective and his ideas about the three varieties of knowledge. Davidson conceptualizes knowledge as a three-legged stool consisting of the subjective, the intersubjective and the objective, none of which can be separated without the whole edifice buckling under. But his characterizations of these three epistemological bases are not quite what we would expect. In particular, he utterly undermines the privileged status of the subjective in ways that I do not wish to paraphrase

here. They are better left to a direct reading of his work. But Davidson's revolutionary rearrangement of the relationships between knowledge of oneself, knowledge of others and knowledge of the world offers exciting avenues for those interested in developing an epistemological basis for concepts such as entrepreneurial opportunities and effectual networks.

13.2.2 For the Mathematically Minded: Effectual Probability

Causation in general has always been a thorn in the flesh for mathematicians, more so for probability theorists. As Pearl (2000: 342) mentions:

This may come as a surprise to some of you but the word *cause* is not in the vocabulary of probability theory; we cannot express in the language of probabilities the sentence, *mud does not cause rain* – all we can say is that the two are mutually correlated or dependent – meaning if we find one, we expect the other.

Naturally, if we lack a language to express a certain concept explicitly, we can't expect to develop scientific activity around that concept.

Effectuation involves causal interventions by human beings in the event space. And that puts a further kink in the machinery. Pearl, however, goes on to develop a probability calculus that includes a 'Do' operator and a new form of notation involving 'surgery' on causal models to capture causal intervention. I see his work as seminal to the development of a formal calculus for an effectual logic, assuming such a thing is at all possible. The only way we can find that out, of course, is to try to build the apparatus.

13.2.3 For the Linguistically Minded: Embodied Cognition

Analysing entrepreneurial narratives and interpreting their meanings are the preferred approaches for a growing number of qualitative researchers. In particular, the metaphors entrepreneurs make and use, the 'errors' in how they interpret reality, and the persuasive power of the rhetoric they employ matter both for practice and scholarship in effectual entrepreneurship. Here again, there are exciting developments in cognitive linguistics that might offer new methodological as well as conceptual possibilities. Lakoff and Johnson (1980) introduced a way to analyse metaphors with the agenda of locating meaning in biology. In their view, the very fabric of language is *embodied*. Metaphors are the basic building block of language. All words, as Borges has pointed out, are but dead metaphors. And according to Lakoff and Johnson, these metaphors directly derive from the movement of our bodies in physical and social space.

We can apply these ideas and methods from cognitive linguistics to analyse the performance of new ventures and new markets as artifactual

metaphors. Wedgwood's pots and vases succeeded to the extent that they embodied social mobility, just as Nike thrives on the successful embodiment of the dreams of young athletes. Every new venture, in a sense, not only seeks to achieve its founders' aspirations (a good life for themselves as individuals), but also embodies their ideas about what would be a good world in which to live and achieve those aspirations (ideals about the larger good in other words). Therefore I believe ventures and their business models can be analysed in terms of an artifactual metaphor that reconciles the good life in the large and small for some subset of human beings.

13.2.4 For the Business Ethicist: Reconciling Two Views of the Good Life

Ethicists and economists have always highlighted the tension between the individual and social meanings of the pursuit of the 'good' life. While deontological ethics takes values at the societal level as objective and exogenous to choice processes, free market economics assumes preferences and tastes as subjective and given in its theoretical models (Sarasvathy and Wicks, 2005). As a result, both ethicists and welfare economists often end up with compromise solutions such as legislating tastes or bartering in ideals. But effectual logic, as I have emphasized in several earlier chapters, provides a technique of intersubjective interactions through which both preferences and values are transformed and reformulated in the very process by which they are embodied in new products, firms and markets. In other words, we can hypothesize that the reconciliation between people's views of the good life for themselves as well as for the communities they live in becomes an integral part of the effectual artifacts they build. This suggests that business ethics may find it useful to move beyond its current focus on the moral behavior of large corporations enforced through regulatory compliance to the moral agency of entrepreneurship in building better corporations.

13.2.5 For the Logician: Relevance Logics

As I mentioned in Chapter 9, a formal analysis of an effectual logic will probably involve relevance logics. Relevance logics (sometimes called 'relevant' logics, particularly by Australian logicians) worry about the logical paradoxes that ensue from 'material implicators' in classical truth-functional logic. Consider, for example, the fact that in classical logic, a falsehood implies the truth of any proposition. In other words, 'If I am the Buddha, two plus two equals five.' Relevance logicians are engaged in the development of logics in which even if I am the Buddha, two plus two still ought to equal four. In other words, relevance logics seek to restrict

implications or entailments in ways that are relevant to the semantics of the arguments. For example, in using predicate calculus, relevance requires that variables and constants between premises and conclusion be shared. I developed one fleeting example of this for effectuation when I showed how effectual entrepreneurs make decisions as though double negatives do *not* make a positive. That is but the proverbial tip of the iceberg. I believe there is work to be done by logicians for an effectual logic to be put to use in more formal ways.

13.2.6 For the Econometrician: Habitual Entrepreneurship

I have elaborated in some depth in Chapter 6 on the necessity of understanding habitual entrepreneurship if we are to trace the performance consequences of an effectual logic. Even a simple econometric picture of this phenomenon is as yet non-existent. I would very much like to see a serious data-collection effort in this arena that helps us sort out key relationships between firm performance and temporal portfolios of firms over the careers of entrepreneurs. This seems to be a very doable econometric project eminently worth doing.

13.2.7 For the Economist: *Even-if* Theories

Throughout the book, I have pointed to several areas of future research in economics that can build upon an effectual logic. But I would like to reiterate here the possibilities I laid out in Chapter 9 for building *even-if* theories rather than *as-if* theories of economics. This entails a radical revision of the behavioral basis for most theories of choice, which will then affect a variety of economic theories, such as contract theory, transaction costs, evolutionary and institutional economics, and public and social choice. Tracing out the micro- and macroeconomic implications of an effectual logic, I believe, must form the core of any serious incorporation of entrepreneurship into useful theories of development and welfare.

13.2.8 For the Legal Theorist: Rethinking Corporations and Financial Markets

If social entrepreneurs are to successfully leverage an effectual logic into market-based solutions for social problems, it is imperative that we rethink extant legal and tax structures for corporations and for financial markets. I have tried to make a strong case for this in Chapter 10. But the proverbial devil, of course, is in details that have to be worked out by legal and financial theorists.

13.2.9 For the Organization Theorist: Technologies of Foolishness

March's work on goal ambiguity (Manns and March, 1978) and the pitfalls of learning (Denrell and March, 2001) have already paved the way for developing what he calls 'a technology of foolishness' (March, 1982). In a recent article with Dew, I described the role of an effectual logic in further developing such a technology (Sarasvathy and Dew, 2005a). As demonstrated there and in several places throughout this book, March's ideas have exerted a profound influence on the development of effectuation. I see several avenues for continuing that line of research, particularly as it pertains to theories of organizational identity, learning and culture. Some specific questions could include an exploration of (a) how slack resources may be used by organizations for exaptive as well as adaptive purposes; (b) how early footprints of founders constrain paths of organizational growth; (c) how organizational identity influences business model choice, and vice versa.

13.2.10 For Different Functional Areas of Management

Virtually every area in business management research offers research possibilities for tests and applications of an effectual logic. Marketing and strategic management, especially topics related to new product and new business development, come immediately to mind. Besides urging an emphasis on exit strategies, an effectual logic highlights the importance of revisiting some fundamental issues such as the four Ps in marketing and basic competitive analysis in strategy. Just for starters, what would these concepts look like in an effectual universe? And why and how would it matter whether these were conceptualized effectually as opposed to a predictive approach?

Colleagues from finance and accounting have pointed out to me that besides issues involved in building markets in human hope, recent developments in behavioral finance (Thaler, 2005) and behavioral accounting (Ansari, 1997) also offer possible avenues for future research related to effectuation. Finally, organizational behavior and human resources management with their disciplinary basis in psychology suggest natural overlaps in terms of decision analysis and group cognitions.

13.2.11 For the Psychologist: Emotions, Passion and Effectual Negotiations

Recent work in entrepreneurship research has begun building upon psychological theories of affect as well as thought and behavior. Effectual entrepreneurship opens up a variety of possibilities for exploring the role of

emotions (Shepherd, 2003), passion (Cardon et al., 2005), and even neuro-physical mechanisms (Glimcher, 2003) in economic choice and action. Effectual entrepreneurship provides interesting venues for studying these in intersubjective processes such as effectual stakeholder networks. Advice and docility have affect components as well as cognitive elements. An exploration of these both through laboratory and field experiments should help deepen our understanding of the psychology of an effectual logic.

Studies of integrative negotiation suggest another promising avenue for research into effectual interactions. Simply put, while distributive bargaining assumes a fixed pie and involves haggling over the size of each piece, integrative bargaining offers the potential for increasing the size of the pie and provides incentives for cooperative negotiations. In particular, extant research has suggested certain key elements of integrative negotiations such as non-specific compensation, logrolling, cost cutting and bridging, which have been shown to be related to expanding the pie (Pruitt, 1981). Each of these elements, I believe, suggests possibilities for research that can extend our understanding of the making of new pies or, more accurately, the transformation of existing pies into new ones – the problem that is at the heart of effectual negotiations.

13.2.12 For the Policy Researcher: Development of New Ends

In an intricate and powerful thesis about economic development as increasing with the growth of individual freedoms, Amartya Sen (2000: 53) argues that freedom has to include the freedom of individuals to fabricate and follow their own ends as well as to acquire the means to achieve more conventionally determined ends:

The ends and means of development call for placing the perspective of freedom at the center of the stage. The people have to be seen, in this perspective, as being actively involved – given the opportunity – in shaping their own destiny, and not just as passive recipients of cunning development programs.

The primary opportunity that economic development initiatives need to provide, as Sen points out, consists in the freedoms that people need to be able to fulfill both the creation and achievement of their own ends, whatever these might turn out to be, within the constraints, of course, of the liberties of others to do the same. An effectual economics embraces at its core individual entrepreneurs and their stakeholders co-creating new ends. As such, it can provide content and texture for needed freedoms as well as methods to achieve the freedoms that form the true measure of Sen's conceptualization of economic development. I see several possibilities, including field research on what entrepreneurs are already striving to do in

underdeveloped regions of the world, and ways to remove regulatory impediments, rather than merely providing seed money and/or second-hand technologies. I also visualize field experiments such as those designed by Mancur Olson (1984) that could match and measure contrasting levels of freedom and relate these to levels of effectual entrepreneurship.

13.2.13 For the Sociologist: Intentions, Advice and Effectual networks

In several parts of the book I have referred to social movements theory and Joas's exposition of the creativity of action. There are additional areas of research in sociology that may be relevant to future research built upon an effectual logic. Of particular relevance are the works of Lawler and his collaborators, whose theory of relational cohesion predicts how and why people in exchange become committed to their relationships and end up creating and transforming 'micro social orders' (Lawler, 1993, 2002).

Besides the origin and dynamics of effectual networks, an effectual logic might also have something to contribute to and gain from sociological debates about agency versus structure (also prevalent in other guises, such as attitude versus behavior, intentions versus fields, and so on) in social processes. Urging a pragmatist approach to resolving these debates, Fuchs (2001: 25) summarizes the micro-macro problem in sociology as follows:

Arguably, not much actual progress has been made in the micro/macro mystery (Alexander et al. 1987). For the most part, it is social theorists who wonder about the relationship between agency and situation. Their more empirically minded peers do their research on either agency or structure, without worrying about their general connection. Theorists who work to bridge the agency/structure gap in theory often keep the two apart when they are not doing theory.

Here again the juxtaposition of an effectual logic with Davidson's three-legged epistemology and the introduction of concepts such as docility and advice (in conjunction with or as alternatives to charisma theories) should open up an interesting discourse with sociology.

Finally, there is also the matter of entrepreneurship itself as a growing social force and the increasing power of an entrepreneurial ethic in the world.

13.3 CONCLUSION: ENTREPRENEURSHIP AS METHOD

The Wildlife Conservation Society, in partnership with Bolivian officials in charge of protected areas, recently auctioned off the right to name an entire

species of monkey. This 'first' in the history of species discovery was both hailed as courageous and entrepreneurial and reviled as crass and commercial. The new species of brown and orange monkey was discovered by wildlife conservationist Robert Wallace in the exotic South American Madidi National Park. The closing price on the auction was \$650 000.

It could very well be that historians one day will come to view entrepreneurship as the dominant ethic of our time, extending several centuries ahead of us.¹ There are some interesting questions for those of us who live through the early stages of the rise of such an ethic: is entrepreneurship a destination or a method? Is it about striving to build an entire world in the single shining image of Silicon Valley, or is it about transforming locality and contingency into valuable opportunities many of which will look nothing like Silicon Valley? Is it about inventing new means to achieve agreed-upon economic ends within varying cultural contexts, or does it involve inventing new ends (economic and otherwise) that transform current conceptions of cultural and economic contexts? Our choices with regard to these questions could make a difference to what happens next.

There is a rising excitement in developing countries about free markets and entrepreneurial capitalism and a variety of related phrases, most of which carry unspoken assumptions and diverse interpretations in different parts of the world. Consider for example the fact that there are hundreds of new business schools being developed in India alone, with the growth rate of MBAs graduating each year increasing steadily. Similar trends hold in China and other developing countries. What are these students being taught about markets and economies and the entrepreneurship ethic? What should they be taught? What toolboxes are they provided with in building actual ventures and markets? What should they be equipped with, and how will we know? Furthermore, is it enough to educate MBA students and potential entrepreneurs, or should entrepreneurship education pervade the population more widely and become part of high school and grade school curricula, as argued by Venkataraman (2005; from the keynote address at ESBR Conference, IESE, Barcelona, Spain, September)?

Billions of dollars of developmental aid pour into programs that have recently started spouting their own versions of the entrepreneurial ethic in countries as disparate as Moldova and Uganda. Yet these are often tied to precise measures of performance arrived at through an econometric calculus at the theoretical heart of which there is no role for entrepreneurial judgment at all. Recall Schumpeter's and, more recently, Baumol's striking metaphor of *Hamlet* without the Prince of Denmark. Need we, as Sen (2000) argues based on the efficacy of human agency, change developmental performance measures to include freedoms rather than prespecified economic outcomes?

[t]he basic issues confronted here are of some general interest for the main approach of this book, and involve both the importance of agency (seeing people as agents rather than as patients) and the informational focus on capability deprivation (rather than only on income poverty). The first question relates to the need, emphasized throughout this work, to see people – even beneficiaries – as agents rather than as motionless patients. The objects of ‘targeting’ are active themselves, and their activities can make the targeting achievements quite different from targeting-attempts (for reasons already discussed). (Sen, 2000: 137)

Current theorizing in economic development mostly sees the entrepreneurial function as an automatic and formalizable relationship between the sources of capital (cash, natural resources, technology, education or human capital, etc.), certain institutional frameworks (property rights, rule of law, etc.), and outcome variables (such as per capita income, employment, etc.). In other words, particular combinations of resources and institutions within a capitalistic system result in economic growth. But as Penrose (1959) and others have repeatedly urged us to reflect, do resources matter by themselves or is what people *do* with those resources the phenomenon of significance? In other words, is entrepreneurship a function or a factor in a system of production, or is it a method by which such systems are made, transformed and unmade?

I think I have made my position on this very clear. This book is a call for viewing entrepreneurship not as a tool or a destination, but as a method such as the scientific method. And an effectual logic fuels the entrepreneurial method, just as the scientific method operates through the logic of experimentation. Science may or may not succeed in achieving any of its much-touted targets, such as discovering a grand unified theory of everything or the irreducible code of life itself. Nor can it guarantee that its applications will result in a better world, however defined. Yet its potential for any good at all derives from the fact that it is a *method* and a worldview, a process involving a logic that can be taught and learned by an increasing variety of individuals who can make a variety of contributions that, on average, begin to look very much like progress over time. One measure of this progress is how well it helps us harness the potential of nature for the achievement of our ends. Similarly, we may reconceptualize entrepreneurship as a method for unleashing human nature to achieve, transform and generate our ends. Specification of an effectual logic, I hope, is a useful step in this reconceptualization.

NOTE

1. The so-called clash of (Western versus Islamic) civilizations notwithstanding, and assuming there is not an environmental or technological disaster that wipes humanity out.

Appendix 1 Research instrument

INTRODUCTION

In the following experiment, you will solve ten decision problems. These problems arise in the context of building a new company for an imaginary product. A detailed description of the product follows this introduction.

Although the product is imaginary, it is technically feasible and financially viable. The data for the problems have been obtained through realistic market research – the kind of market research used in developing a real-world business plan. So far, the entrepreneurs who participated in this study found the project both interesting and feasible.

Before you start on the product description and the problems, I do need one act of creative imagination on your part. I request you to put yourself in the role of the lead entrepreneur in building this company – i.e. you have very little money of your own to start this company, but you have about five years' relevant working experience in the area.

DESCRIPTION OF THE PRODUCT

You have created a computer game of entrepreneurship. You believe you can combine this game with some educational material and profiles of successful entrepreneurs to make an excellent teaching tool for entrepreneurship. Your inspiration for the product came from several reports in the newspapers and magazines about increasing demand for entrepreneurship education; and the fact that a curriculum involving entrepreneurship even at the junior high or high school level induces students to learn not only business-related topics but math and science and communication skills as well.

The game part of the product consists of a simulated environment for starting and running a company. There are separate sub-simulations of markets, competitors, regulators, macroeconomic factors and a random factor for 'luck'. The game has a sophisticated multimedia interface – for example, a 3D office where phones ring with messages from the market, a TV that will provide macroeconomic information when switched on, and simulated managerial staff with whom the player (CEO) can consult in making decisions. At the beginning of the game, the player can choose from a variety

of businesses the type of business he/she wants to start (for example: manufacturing, personal services, software, etc.) and has to make decisions such as which market segment to sell to, how many people to hire, what type of financing to go for, etc. During the game, the player has to make production decisions such as how much to produce, whether to build new warehouses or negotiate with trucking companies, and so on; marketing decisions such as which channels of distribution to use, which media to advertise in and so on; management decisions involving hiring, training, promoting and firing of employees, and so on. There is an accounting subroutine that tracks and computes the implications of the various decisions for the bottom line. The simulation's responses to the player's decisions permit a range of possible final outcomes – from bankruptcy to a 'hockey stick'.

You have taken all possible precautions regarding intellectual property. The name of your company is *Entrepreneurship, Inc.* The name of the product is *Venturing*.

PROBLEM 1: IDENTIFYING THE MARKET

Before we look at some market research data, please answer the following questions – one at a time:

- 1. Who could be your potential customers for this product?
- 2. Who could be your potential competitors for this product?
- 3. What information would you seek about potential customers and competitors? List questions you would want answered.
- 4. How will you find out this information – what kind of market research would you do?
- 5. What do you think are the growth possibilities for this company?

PROBLEM 2: DEFINING THE MARKET

In this problem you have to make some marketing decisions.

Based on *secondary market research* (published sources, etc.), you estimate that there are three major segments who are interested in the product:

<i>Segment</i>	<i>Estimated total size</i>
Young adults between the ages of 15 and 25	20 million
Adults over 25 who are curious about entrepreneurship	30 million
Educators	200 000 institutions

The estimated dollar value of the instructional technology market is \$1.7 billion.

The estimated dollar value of the interactive simulation game market is \$800 million.

Both are expected to grow at a minimum rate of 20 per cent p.a. for the next five years.

The following are the results of the primary (direct) market research that you have completed.

Survey #1 – Internet users were allowed to download a scaled-down version (game stops after 15 minutes of playing) of the prototype and were asked to fill out a questionnaire

- You get 600 hits per day
- 300 of them actually download the product
- You have 500 filled out questionnaires so far.

<i>Willing to pay (\$)</i>	<i>Young adults (%)</i>	<i>Adults (%)</i>	<i>Educators (%)</i>
50–100	45	26	52
100–150	32	38	30
150–200	15	22	16
200–250	8	9	2
250–300	0	5	0
Total	100	100	100

Survey #2 – The prototype was demonstrated at two Barnes & Noble and three Borders Bookstores in Pittsburgh

<i>Willing to pay (\$)</i>	<i>Young adults (%)</i>	<i>Adults (%)</i>	<i>Educators (%)</i>
50–100	51	21	65
100–150	42	49	18
150–200	7	19	10
200–250	0	8	7
250–300	0	3	0
Total	100	100	100

Survey #3 – focus group of educators (high school and community college teachers and administrators)

The educators who participated in the focus group find the product exciting and useful – but want several additions and modifications made before they would be willing to pay a price of over \$150 for it. As it is, they would be willing to pay \$50–80 and would demand a discount on that for site licenses or bulk orders.

Both at the bookstore demo and the focus group, participants are very positive and enthusiastic about the product. They provide you good feedback on specific features and also extend suggestions for improvement. But the educators are particularly keen on going beyond the ‘game’ aspect; they make it clear that much more development and support would be required in trying to market the product to them. They also indicate that there are non-profit foundations and other funding sources interested in entrepreneurship that might be willing to promote the product and fund its purchase by educational institutions.

Based on all your market research, you arrive at the following cost estimates for marketing your product.

Internet	\$20 000 up front + \$500 per month thereafter
Retailers	\$500 000 to \$1 million up front and support services and follow-up thereafter
Mail order catalogs	Relatively cheap – but ads and demos could cost \$50 000 up front
Direct selling to schools	Involves recruiting and training sales representatives except locally

Competition

None of the following four possible competitors combine a simulation game with substantial education materials – you are unique in this respect.

<i>Company</i>	<i>Product</i>	<i>Description</i>	<i>Price per unit</i>	<i>Sales (\$m)</i>
Maxis	Sim City	Urban planning simulation	29.95	30
Microprose	Civilization	Civilization building simulation	50.00	20
Sierra On-Line	Caesar	City building simulation	59.95	18
Future Endeavors	Scholastic Treetop	CD-ROMs of Scholastic Books	n/a	1

(New Co. < 1yr old)

The game companies are making a *net return of 25 per cent on sales*.

At this point, please take your time and make the following decisions: (please continue thinking aloud as you arrive at your decisions):

- Which market segment/segments will you sell your product to?
- How will you price your product?
- How will you sell to your selected market segment/segments?

PROBLEM 3: MEETING PAYROLL

You have started the company on a shoestring, using the web as your primary source of marketing. You are six months into marketing your product. You have priced the product at the low end of the surveys at \$79.95. Your sales are up to 300 units per month. Based on numerous suggestions provided by your customers, you believe you can develop an improved version of the product that can be sold for around \$140. You have invested the last of your savings and maxed out your credit cards in developing a prototype of the new version – you need this prototype for a demo at the upcoming Computer Games Fair where you are convinced you can generate interest from major software retailers and book large orders.

You have four employees – and you are out of cash to meet the next payroll. You estimate you need \$50 000 to survive the next three months and complete the demo at the Fair. You have the following four options:

1. Borrow from your wife's parents – they are not overly wealthy, but could probably get their hands on \$50 000 if they needed to.
2. Borrow from some old friends from college and your old job.
3. Convince your parents to take out a mortgage on their house.
4. Convince your employees to wait out the period.

Which of these options would you choose? Why?

PROBLEM 4: FINANCING

Your prototype of the enhanced version has won the first prize in the 'New Product' category at the Computer Games Fair. This in turn has led to inquiries from large retailers such as Egghead Software to market such an enhanced version (with full multimedia capability) nationally. You estimate that it will take you 18 months to develop the enhanced version and about six months after that actually to roll it out on all three channels – web, retail

and mail order. Your product will be priced at \$139.99 per unit. You estimate that you will need \$5 million until break-even (by the third quarter of the fourth year) – this includes product development, putting in place excellent support staff, full-blown advertising and web links, and the development of a small direct sales staff for selling site licenses (bulk orders) from educational institutions.

You estimate the following sales projections for the first five years (you are at the beginning of Year 2 now):

	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	\$100 000	\$500 000	\$1 m	\$6 m	\$10 m
Profits	\$ < 0	\$ < 0	\$0	\$100 000	\$2 m

You have three financing options:

Option 1 A venture capitalist who specializes in startup companies in toys and games and other consumer entertainment products is willing to finance you \$5 million for 48 per cent of your company.

Option 2 A friend of the family who has extensive experience in selling educational materials is eager to go into partnership with you – for 33 per cent of the company. He is able to invest \$5 million but wants to work for the company at a base salary of \$200 000 per year. He agrees to accept a minimum level of \$60 000 for the first two years to keep his family going and defer the rest to when the company starts making money. You like and respect this man and have no personal feelings against him.

Option 3 You can continue to bootstrap the company with internal cash flow – grow at a much slower pace.

Which option would you choose? Why?

If the VC is also willing to take only 33 per cent of the company, which option would you choose?

PROBLEM 5: LEADERSHIP/VISION

You have found the financing and have signed a contract with two major retailers to market your product. You have hired new staff and moved into

new premises. A local newspaper is doing a series of stories on local entrepreneurs and wants to do a story on you – you know that this interview would be a defining moment in the development of your company and you see this as an opportunity to convey to the world (and to your new employees) your vision for your company's future. This newspaper article series has been very successful; it routinely gets picked up by national papers and TV networks. One of the reasons for its success is its headline which consists of a one-line quote that captures the entrepreneur's vision for the company – to be achieved by the year 2001.

You have come up with several possibilities for the one-liner:

1. Sim City is the past – *Venturing* is the future.
2. We aim to create at least a thousand entrepreneurs by the year 2001.
3. The fastest-growing educational game company.
4. Invest in *Venturing* – invest in America's future.

Which one of the above do you choose? Why? If you do not choose any of them and want to come up with ideas for an alternative, please do so.

PROBLEM 6: PRODUCT REDEVELOPMENT

Part One

You are almost at the end of your fifth year in operation – you have just managed to break even (one year later than you projected). You have opened the doors to all three segments. Sales, while they are steady and continuous, are rather lackluster and you start doubting whether you will ever reach your growth targets. You decide to conduct a serious market research initiative in order to find out how to grow your sales. You organize focus groups with both existing customers and potential new customers. The main problem seems to be the 'great divide' between the game aspects and the educational aspects of the product. Over 90 per cent of the participants in your focus groups find the game very interesting. But when it comes to the educational section, there is a clear division of opinion. The participants who primarily enjoy the product as a game almost *never* bother to go through the educational sections and wonder why all that *junk* is in there; and those who are primarily interested in the educational aspects think that that section is inadequate – almost an afterthought rather than a serious and useful educational tool.

How do you respond to this feedback?

Part Two

You go back to the drawing-board and design a prototype for an entirely new version of *Venturing*. This time the game is more interactive – every time the player has to make a decision involving a new factor, the game provides an option for the player to pause and go into education mode and explore the subject to whatever depth level they desire. For example, if there is an announcement of an interest-rate hike on TV, with a mere click of a button, the customer could go into a tutorial on interest rates. This tutorial is basically a hypertext document (with audio and video) with five depth levels. The customer can choose to go through all five levels or return to the game whenever they want. You build a prototype version of this. It is a small prototype with only two tutorials that have five depth-levels. In the final product you plan to provide at least 30 such tutorials. This time the reaction to your prototype and planned final product is not only overwhelmingly positive – i.e. potential customers are *willing to pay up to three times the price* of the original product – but they also suggest that this could be a serious educational product with marketing possibilities that are distinct from the traditional educational games market.

You have to decide whether to undertake this massive product redevelopment or to completely scrap the educational aspects, slightly reduce the product price and go for mass marketing. The redevelopment could cost you as much as \$1.5 million and a separate marketing effort.

Which of the two options do you choose? Why?

Year	1	2	3	4	5	6	7	8
Estimated sales (\$million)	0.10	0.50	1	6	12	18	24	30
Actual sales (\$million)	0.14	0.48	0.84	2.8	4.2			

Assuming you have decided to go in for the redevelopment, you have to choose one of the following three options:

- 1. Undertake the redevelopment effort in house – estimated cost: \$1.5 million.
- 2. Outsource the redevelopment within the USA – estimated cost: \$1.15 million.
- 3. Outsource the redevelopment outside the USA – estimated cost: \$0.85 million.

Which option do you choose? Why?

PROBLEM 7: GROWING THE COMPANY

Part One

You are almost at the end of the sixth year of business. You are now selling two products:

- *Venturing for Fun* (price \$79.99) where you strip the educational aspects of the original version of *Venturing* to a bare minimum set of informational rules and enhance the game aspects; and
- *Venturing for Profit* (price \$389.99), where you offer the full-blown educational version.

Your direct sales staff has swelled to 20 from the original three and you are continuing to expand your salesforce and develop larger versions of *Venturing for Profit* for colleges and graduate schools. Greg Thomas, who is an excellent salesman (selling to the educational segment) and has headed the sales team since Day One, has clearly not kept up with the issues of growing the company – he is definitely not the person to lead the new sales team. How will you deal with this situation?

Would you:

1. Fire him?
2. Hire a new sales manager to head the sales team? If so, would you consult with Greg before doing so? How would you break the news to him?

Please feel free to elaborate on any other way of dealing with the situation.

Year	1	2	3	4	5	6	7	8
Estimated sales (\$million)	0.10	0.50	1	6	12	6*	12	20
Actual sales (\$million)	0.14	0.48	0.84	2.8	4.2	8.6		

Note: * Revised estimate after product redevelopment.

Part Two

Although the company has been growing for a while now, you are trying to keep the entrepreneurial culture of the company alive. But you begin to notice that your partner is fostering a more 'corporate ambiance' – long and unnecessary meetings, complicated organization charts, colorful expense

accounts, ‘consultants’ to ‘optimize market potential’, and so on. When you try to talk with him about it, he argues that it is time for the company to go ‘corporate’ – that such a ‘professional’ image would actually be good for the bottom line.

How will you deal with this situation? Do you think it is time for *Entrepreneurship Inc.* to go ‘corporate’?

Year	1	2	3	4	5	6	7	8
Estimated sales (\$million)	0.10	0.50	1	6	12	6*	12	20
Actual sales (\$million)	0.14	0.48	0.84	2.8	4.2	8.6	20	27.5

Note: * Revised estimate after product redevelopment.

PROBLEM 8: HIRING PROFESSIONAL
 MANAGEMENT

You are now in the eighth year of your company. You are doing very well – surpassing growth targets and building reliable market share. Your sales are \$30 million and you project a growth rate of at least 50 per cent per year for the next three years.

Your board’s advice is to hire professional management to run the company so you can focus on issues of new growth and new strategic initiatives. Assuming you have already developed a short list of three high-potential candidates to interview for the position of COO, how would you prepare for the interview?

List questions you would ask, techniques you would use, and critical issues you would take into account in hiring this person.

Year	1	2	3	4	5	6	7	8
Estimated sales (\$million)	0.10	0.50	1	6	12	6*	12	20
Actual sales (\$million)	0.14	0.48	0.84	2.8	4.2	8.6	20	27.5

Note: * Revised estimate after product redevelopment.

PROBLEM 9: GOODWILL

At this point, you are approached by the principal of an inner city school in your area, who also works with 10 other schools such as hers – she believes that *Venturing for Profit* can be used as a major tool not only

in teaching entrepreneurship but even to get students excited about mundane subjects such as basic mathematics and analytical problem-solving skills. She requests you to work with a couple of really enthusiastic teachers to add some elementary materials to your product to teach in inner city high schools. The project would mean not only an investment of \$100 000 (approx.) for modifications, but also a substantial chunk of your time for about six months during development and then about 10 sessions of classroom participation per year for a couple of years at least.

Note: Your sales are \$30 million and you project a growth rate of at least 50 per cent per year for the next three years.

Will you take the initiative for this project?

If not, why not?

If yes, would you:

- (a) Donate the product?
- (b) Sell it at cost?
- (c) Sell it at your regular profit margin?

Why?

PROBLEM 10: EXIT

You are now in the tenth year of your company – *Venturing for Profit* is a great success and, thanks to your new targeted strategies, even *Venturing for Fun* is growing satisfactorily. You have acquired three other profitable product lines. You are doing \$70 million in sales and project that you will reach \$100 million within a year. At this time you face two possible directions for your company.

Direction 1

Your accountants and bankers think that this is a good time for you to take the company public. The IPO market is booming and both educational games and educational software industries are on a solid upward trend. They estimate you should make an initial public offering of 2 million shares at \$30 per share. The company has a total of 12 million shares outstanding.

Direction 2

At this point in time, Disney approaches you and makes an offer for your company – it seems they have decided to get in on the booming educational software market and have decided to enter the arena through acquisitions – they see you as a perfect fit for their strategy and offer you \$420 million.

Which of the above two directions do you choose? Why?

Year	1	2	3	4	5	6	7	8	9	10
Estimated sales (\$million)	0.10	0.50	1	6	12	6	12	20	30	45
Actual sales (\$million)	0.14	0.48	0.84	2.8	4.2	8.6	20	27.5	38	70

Appendix 2 Protocol from E5

This company could make a few people very rich, but it cannot . . . I don't think it could ever be a huge company. The basic concept is a business simulator . . . startup simulator . . . so . . . in the same way in a jet simulator you can hop in and fly something electronically and not blow it up . . . so you can hop into a business situation and practice and get a lot of reflexes built up and thought processes built up up front. So . . . a successful launch of the first product with a big marketing sales push to penetrate as many different markets as we could . . . might have a successful second product. For example, you could have a product which is how to succeed, prosper, grow and get promoted within a large company. Making an equivalent product for the quote organization person as opposed to the entrepreneur would give you market of everybody with aspirations at IBM, AT&T, Exxon etc. etc. so . . . That product could be a follow-on product . . . the research would be similar, the product development would be similar, and so the production part would be equivalent and some of the same marketing channels would also work. You could make another product, would be, for students. How do I graduate in the top 10 per cent of your class at Stanford, or Harvard or Yale. And there . . . you could simulate the learning process in the classroom. And research traits that tend to make you successful or not. Study habits that tend to make you successful or not. And . . . a lot of how to be a good student is teachable. A lot. In my case for example, I took – So there are studying habits that I'm aware of and you can do research on successful students and you could develop a profile that the . . . marketing pitch of which should be . . . students who graduate in the top 10 per cent of a college class aren't just smart in an accident. They have different habits and ways of doing business that cause them to be successful and those are neither genetic nor intelligence related . . . they are learnable. So there's your . . . now you got a product that can . . . you can sell to every student in the country. uhm . . . so we talked about entrepreneur business, big business, students, *so we're really talking about any learning in an interactive situation where simulation is a benefit.* So you got . . . next there is negotiation . . . there are books on negotiators . . . how to negotiate . . . famous books . . . here you could . . . in reading a book about negotiation would be less effective than having an interactive 3D game about negotiation. So there you could practice being a good negotiator.

And that would work. There's not a salesman in the United States who wouldn't buy one of those. How to sell you know so you got you know another learning situation where how you act and how you push people can can help you sell better. So . . . there is sales. So I guess you could go on and on and then you could generalize the thing to *any situation which requires some sort of technical knowledge* . . . technical knowledge of negotiating . . . technical knowledge of bio-molecules . . . which also involves human organization . . . people you have to deal with . . . both outside the company to get them to help . . . to work with them and inside the company to get them to understand what is the company's methods objectives etc. *So an organization in a learning situation with technical requirements*. That simulation that had those traits so now you can . . . I gave four five endeavors . . . you can expand that so . . . maybe I'm gonna change my opinion about the growth potential for the company . . . The company could . . . it is easy to see how within an hour you could name 10 products and the 10 products would address huge markets like all employees in Fortune 500 companies that . . . who are rich enough to pay hundred dollars for it. So now all of a sudden you can see it's a software that could be a . . . could be a hit on the scale of Lotus . . . what Lotus was to the spreadsheet world. *And therefore you could see a several hundred million dollar company coming from it.*

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