



Learning from the Future: Essays on Uncertainty, Foresight, and the Long Term

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**Learning from the Future:
Essays on Uncertainty, Foresight, and the Long Term**

A dissertation presented

by

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in partial fulfillment of the requirements

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**Learning from the Future:
Essays on Uncertainty, Foresight, and the Long Term**

ABSTRACT

How to formulate strategy given the uncertainty of the future is the central question that managers face. The purpose of this dissertation is to investigate one possible answer: the use of strategic foresight, defined not as the ability to predict the future, but rather as the deliberative consideration of multiple plausible futures. In the first essay, I reinterpret Frank Knight’s seminal distinction between “risk” and “uncertainty,” arguing that the absence of analogous circumstance is the defining characteristic of uncertainty. The quest for analogy explains the work of Herman Kahn, the postwar defense intellectual who advocated the use of “ersatz experience,” most notably fictional future scenarios, as a tool for considering strategy amid the uncertainty of the nuclear revolution. In the second essay, I build on the relationship between analogy and uncertainty to construct a theoretical foundation for strategic foresight, which lacks grounding in the management literature. In contrast with the managerial tendency to analogize to past experience, the consideration of multiple imagined futures reduces the danger of prematurely fixating on a focal hypothesis, thereby reducing bias and improving judgment under uncertainty. In the third essay, I report the results of a qualitative study of the U.S. Coast Guard’s “Project Evergreen,” a quadrennial scenario-planning exercise. Project Evergreen has enabled the organization to develop strategy for the long-term future while also facilitating action in the present, easing the tension between exploration and exploitation by promoting a nonlinear

conception of time. I introduce the notion of “scrappy foresight” to suggest that imagination is a valuable, but inexpensive, strategic resource. As a whole, this dissertation suggests that strategy, particularly long-term strategy, benefits from efforts that directly engage the uncertainty of the future.

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To Theo

We have no idea, now, of who or what the inhabitants of our future might be. In that sense, we have no future. Not in the sense that our grandparents had a future, or thought they did. Fully imagined cultural futures were the luxury of another day, one in which “now” was of some greater duration. For us, of course, things can change so abruptly, so violently, so profoundly, that futures like our grandparents’ have insufficient “now” to stand on. We have no future because our present is too volatile. ... We have only risk management. The spinning of the given moment’s scenarios. Pattern recognition.

—From *Pattern Recognition* by William Gibson

We say that only the things of the present exist; the past no longer exists and the future doesn’t exist yet. But in physics there is nothing that corresponds to the notion of the “now.” Compare “now” with “here.” ... No one would dream of saying that things “here” exist, whereas things that are not “here” do not exist. So then why do we say that things that are “now” exist and that everything else doesn’t?

—Carlo Rovelli, *Seven Brief Lessons in Physics*

INTRODUCTION

In 1921, economist Frank Knight proposed his seminal distinction between “risk” and “uncertainty.” Situations of “risk” are those in which it is possible to calculate the probabilities of possible futures because similar past situations provide a defined set of outcomes and a known distribution of probabilities. By contrast, in situations of “uncertainty,” it may not be possible to identify all possible futures, let alone to assign them frequentist probabilities. Because, Knight argued, most business decisions lack precedent, uncertainty presents a fundamental challenge to managers, who have to act in the face of inadequate information about the future. In such cases—cases of uncertainty—Knight wrote that the manager’s only recourse is superior judgment. Unfortunately, he had few suggestions on how to cultivate that talent. Management, Knight shrugged, was an “art,” not a “science.” As a result, he elided the very question that he claimed formed the manager’s chief predicament: how to formulate strategy given the uncertainty of the future. Nearly a century later, that remains the central question facing the firm.

The purpose of this dissertation is to investigate one possible answer to this vexing question: the use of strategic foresight, defined as the deliberative consideration of multiple futures so as to improve judgment and strategy amid uncertainty. In the three papers of my dissertation, I analyze strategic foresight from historical, theoretical, and empirical perspectives.

In the first essay, I use a close textual read of Knight’s work to reinterpret his concept of uncertainty, arguing that Knightian uncertainty is defined not simply by the inability to assign probabilities to outcomes, but more fundamentally by the absence of analogy, which in turn necessitates managerial judgment. Using archival materials and other primary sources, I then investigate efforts by scholars at the postwar RAND Corporation, most notably Herman Kahn, to mitigate the problem of judgment under uncertainty, which they faced as a result of the nuclear

revolution. I make the counterintuitive finding that Kahn, often thought to embody the quantified rationalism of Cold War science, addressed the problem by imagining alternative futures via war games and scenarios to generate artificial analogies, providing “ersatz experience” that could inform judgment. Those techniques then spread to business, and today scenario planning is a widely used strategic foresight tool.

In the second essay, I build on the relationship between analogy and uncertainty and construct a theoretical foundation for the notion of strategic foresight, which lacks grounding in the management literature. In contrast with some strategy scholars, I argue that the managerial tendency to make sense of uncertainty by analogizing to past experience (especially a single past experience) is problematic because it generates a biased, difficult-to-change hypothesis about the future—i.e., a prediction. By encouraging the consideration of multiple imagined futures, strategic foresight techniques like scenario planning reduce the danger of prematurely fixating on a focal hypothesis while respecting the irreducible uncertainty of the future, thereby reducing bias and improving judgment. I further note that, to the extent that strategic foresight techniques make managers better able to sense environmental change, seize opportunity, and reconfigure assets, it constitutes a dynamic capability, establishing a benchmark by which to measure the utility of constructed analogies.

In the third essay—an interview- and archive-based study of the U.S. Coast Guard’s “Project Evergreen,” a quadrennial scenario-planning exercise—I investigate how strategic foresight can ameliorate short-termism, which organizational theory characterizes as a response to the uncertainty of the long-term future. I find that, by creating a structure for engaging and bounding the uncertainty of the future, the Coast Guard, which had traditionally focused almost exclusively on the present, was able to attend more to the future. Further, this increased attention

enhanced rather than detracted from the Coast Guard's ability to operate in the present. Evergreen made the organization more ambidextrous, and I suggest that it did so by reconfiguring mental models such that managers began to perceive short-term demands and long-term needs as complementary rather than competing. Managers became more tolerant of the ostensible paradox between exploration and exploitation by adopting a nonlinear perception of time—one in which imagined futures influenced present actions, which then revised imagined futures, and so on. They developed a capacity to learn from the future. I conclude by introducing the notion of “scrappy foresight,” in which imagination is an invaluable but inexpensive strategic resource that organizations can leverage to better sense, shape, and adapt to the future.

In sum, while this dissertation is phenomenologically focused on strategic foresight—most notably scenario planning—it is thematically more capacious, addressing persistent theoretical questions in the management literature: What is the nature of uncertainty, what are the determinants of good judgment, and how can managers grapple with paradox?

Essay 1

“Unfathomable Mystery”

Frank Knight, Herman Kahn, and the Pursuit of Judgment

ABSTRACT

Frank Knight's famous distinction between "risk" and "uncertainty" was based on the limits of analogy. In situations of "risk," the probability of an outcome could be inferred from similar past situations, facilitating decisions. However, in novel situations, no such comparisons were possible, preventing statistical inference. In these cases—cases of "uncertainty"—the manager's only recourse was superior judgment. Knight, however, had few suggestions on how to cultivate that talent. Management, he shrugged, was an "art," not a "science," and strategy was a "delusion." As a result, he elided the very question that he said formed the manager's chief predicament: What to do in the face of uncertainty? Thirty years later, this question galvanized a group of postwar thinkers at the RAND Corporation. Although RAND is often caricatured for scientific efforts to eliminate judgment from decision-making, many of its scholars—most notably Herman Kahn—wrestled with the implications of uncertainty. This paper focuses on techniques they developed for using fictional scenarios and loosely structured games to explore uncertainty and cultivate judgment. It argues that these methods, which were later adopted by corporations, were devices for creating analogy, thereby resolving Knight's dilemma through what Kahn called "ersatz experience." If the past could not provide a guide to the future, perhaps the (imagined) future itself could, enabling managerial decision-making in the face of the unknown. This paper thus details unexplored aspects of Knight's influence on management, further revises the rationalist conception of RAND, and advances the intellectual history of uncertainty.

INTRODUCTION

Frank Knight was one of the most notable economists of his generation. A founder of the Chicago School, he mentored three Nobel laureates, served as president of the American Economic Association, and was a charter member of the Mont Pelerin Society.¹ The 1921 book that stemmed from his doctoral dissertation, *Risk, Uncertainty and Profit*—which defined uncertainty as the absence of analogy—was republished in 1933, 1948, and 1956, and remains in print nearly 100 years later, despite the diffidence of its opening line: “There is little that is fundamentally new in this book” (Knight, 1921, p. ix). His legacy as an economist and philosopher—for he was both—is complex, but he was a fierce, if grim, intellectual warrior, writing tracts about the science of economics, the threats to liberalism, and the need for social progress.

When it came to management, however, Knight was more circumspect. He maintained that uncertainty necessitated good judgment, but he was vague about how managers might develop it. He dismissed scientific management—he disapproved of applying Frederick Taylor’s principles to anything but technical problems—but he proposed no alternative (Knight, 1923/2011a). At times, he seemed to throw up his hands when confronted with the practical challenges of running a business. The hiring, organization, and motivation of employees were matters for an intuitive faculty whose source was as mysterious as it was important. This held true for firm strategy as well: “It is a great and decisive thing to create and inspire an organization and to direct its operations in the large, sensing the general drift of events and indicating the necessary dispositions to meet them” (Knight, 1923/2011a, p. 24). As for how to do great and decisive things, he was unclear. Management, he wrote, was an “art,” not a

¹ The laureates were Milton Friedman, George Stigler, and James Buchanan.

“science,” and given the unpredictability of the future and the elusive determinants of good judgment, strategy was “a delusion” (Knight, 1923/2011a, p. 52). As a result, Knight (1921, p. 268) elided the very question that, he wrote, formed the manager’s chief quandary: What to do in the face of uncertainty?

Knight is thus remembered as an economist, not a management theorist. Yet this distorts or even inverts his most important legacy. Knight may have been a giant roaming the halls at the University of Chicago, but his notion of uncertainty catalyzed little theoretical elaboration or empirical research among economists (Hodgson, 2011). By midcentury, economics had embraced formal modeling that did not allow for ghosts in the machine, and uncertainty threatened the discipline’s very foundations. By contrast, the impact of uncertainty on organizational theory was tremendous. Ronald Coase’s (1937) path-breaking paper “The Nature of the Firm” was explicitly based on Knightian uncertainty. The work of Herbert Simon, who crossed paths with Knight at Chicago, has clear antecedents in *Risk, Uncertainty and Profit*, which essentially laid out the concept of “bounded rationality” that Simon (1947) would later expound in his classic book *Administrative Behavior* (Rakow, 2010). And contingency theory was a response to the uncertainties stemming from the organization’s interaction with its environment (Burns & Stalker, 1961/1994; Lawrence & Lorsch, 1967; Thompson, 1967). Indeed, the centrality of Knightian uncertainty to so many areas of organizational behavior has prompted a fresh wave of attention in the management literature (Alvarez et al., 2018).²

Obviously, Knight was not the only economist to write about uncertainty. John Maynard Keynes (1921, 1936, 1937) and, later, G. L. S. Shackle (1972) both wrote extensively about the central role that uncertainty about the future played in the economy. But Knight was the one who

² *Academy of Management Review* plans to publish a Special Topic Forum on Knightian uncertainty in 2020.

left the concept on management's doorstep, an orphan of analogy crying out for judgment. This marked a crucial disciplinary handoff: Where economics left off, management began. The moment at which Knight injected uncertainty into the economic conversation is roughly coincident with the rise of the managerial class and of business schools, which sought to professionalize management (Khurana, 2007). In a sense, management is the study of economic activity that remains unexplained by formal economic theory.³ Which is perhaps why Knight, an economist, did not pursue it.

The purpose of this paper is to pick up where Knight left off. It reinterprets his seminal book and traces the work of a group of thinkers—most notably Herman Kahn—who, galvanized by the specter of uncertainty, developed qualitative methods for bounding it. Somewhat ironically, they did so at the RAND Corporation, which is often caricatured for the very scientism that angered Knight and diminished his impact on economics, but which also hosted iconoclastic scholars notable for their epistemological humility at a time of great hubris in the social sciences (Augier et al., 2015). That humility was appropriate. The nuclear revolution—in which the United States and the Soviet Union acquired the ability to destroy one another as functioning civilizations in a matter of minutes—was perhaps the epitome of Knightian uncertainty, a situation utterly devoid of historical analogy. The question RAND scholars faced was how best to structure U.S. forces and doctrine so as to avoid a nuclear war, while simultaneously preparing to fight one if necessary. It was a question that experience could not answer—or even frame—for the simple reason that no one had ever fought a nuclear war.

³ Angus Burgin (2014) makes this point as well: “The modern discipline of management, in this sense, was born in large part out of an attempt to theorize precisely the kinds of uncertainty that professors of economics increasingly ignored” (p. 9).

Uncertainty was therefore an immediate and existential concern, and good judgment a matter not of profit, but of survival.

What is remarkable about these scholars is not only that their definition of uncertainty uncannily mirrored Knight's, but that they developed tools for building the judgmental capacity that Knightian uncertainty demanded. They did this, in essence, by manufacturing analogy, conjuring hypothetical futures through the use of war games and scenarios and thereby providing what Kahn (1960) would call "ersatz experience" (p. 416).⁴ In sum, Knight teed up the question: What makes for good judgment? And Kahn and his colleagues provided an answer, solving the problem on Knightian terms. The effects would be felt not only among postwar defense intellectuals, but also among managers, who had been grappling with the problem of judgment and whose interest in heuristics for developing judgment would only increase as globalization injected a new dose of uncertainty into the system.

In tracing these developments, this paper reinterprets Knight's seminal work and details previously unexplored aspects of his influence on management. It further revises the understanding of RAND as a rationalist institution and illuminates a moment in which Kahn did nothing less than shift the dominant ontology of the future. And, perhaps most importantly, it contributes to the intellectual history of uncertainty and its partner, judgment.

FRANK KNIGHT

Frank Knight was born in 1885 in rural Illinois to a farming family who took their scripture seriously. After attending the small, evangelical Milligan College with the intention of

⁴ Readers familiar with Harvard Business School will recognize the case method as a form of instilling judgment through ersatz experience (see, for example, Christensen et al., 1991).

becoming a minister, he eventually graduated from the University of Tennessee in his mid-20s—the delay caused in part by the need to contribute to his parents’ farm—by which point he was an avowed atheist and confirmed critic of dogma, religious or otherwise. In fact, when he went to Cornell to pursue his Ph.D., his intention was to study philosophy, but the department ultimately rejected him because it deemed his skeptical mindset inappropriate to philosophical inquiry. He thus made his way to economics, graduating in 1916 with a dissertation that would become the basis for *Risk, Uncertainty and Profit*. But his philosophical bent—and his committed skepticism—would never leave him, defining his tenure at the University of Chicago, where he spent nearly his entire career.

There, he gained a reputation as a provocative and intimidating teacher who questioned everything, including himself, in a relentless pursuit of truth that brooked no sympathy for authority.⁵ As George Stigler (1973) memorably put it: “Knight would not hesitate to tell Gabriel if his horn needed tuning” (p. 518). The ability—the insistence—on seeing both sides of any issue was the hallmark of his work. He could be reflexively contrarian. He once acknowledged that, when listening to an orthodox economist propounding the virtues of neoclassicism, “I am a rip-roaring institutionalist” (Knight, 1960, p. 82). But when speaking to an institutionalist attacking those same ideas, “I defend the system, the orthodoxy that is treated with so much contempt by followers of Veblen” (Knight, 1960, p. 82). Occasionally, this tendency verged on self-parody, as in his parting address to the American Economic Association, during which he declared, “All principles are false, because all are true—in a sense and to a degree” (Knight, 1951, p. 6).

⁵ James Buchanan (1968, p. 427) wrote that Knight’s real contribution to the Chicago School was this spirit of independent thinking.

Whether parody or profundity, that statement helps explain why Knight's oeuvre often seems to contradict itself. It seems contradictory because it is—Knight's beliefs and life are marked by paradox.⁶ He was a friend of Friedrich Hayek and a founder of the libertarian Mont Pelerin Society, but he was a critic of the Austrian school of economics. He believed that economics was a true and exact science, like mathematics, but he did not believe that it accurately described reality.⁷ He was a founder of the Chicago School, but that collection of thinkers later rejected his insistence on the centrality of uncertainty to economic life.

To Knight, uncertainty sprang from our limited knowledge of the future, yet this limited ability to anticipate events enabled key elements of capitalism—entrepreneurship, organization, and profit itself. Challenging economic orthodoxy, Knight argued that, under the state of perfect information that neoclassical economists assumed, the novelty that marked innovation would be logically impossible, the need for formal arrangements to guarantee the behavior of others would vanish, and profits would simply be competed away. Uncertainty was therefore a conscious challenge to *homo economicus*. It was what Knight scholar Ross Emmett (2009), channeling philosopher Richard Rorty, has called a “therapeutic” tool. That is, it was the concept that Knight used to inject humility into a discipline that he worried was drawn increasingly to oversimplification, particularly via formal modeling.⁸ To Knight, then, uncertainty was double-edged, enabling the economics of capitalism while constraining economists.

⁶ As historian Dorothy Ross (1991) has written, Knight “ended time and again in paradox” (pp. 423–424).

⁷ Reality, in this case, refers to actual human economic behavior. In fact, Knight (1951/2013) began the textbook he wrote on economics by warning readers against attaching too much importance to the discipline: “There is no more important prerequisite to clear thinking in regard to economics itself than is recognition of its limited place among human interests at large” (p. 3).

⁸ More broadly, Knight saw uncertainty as a mechanism for injecting doubt into a society that he feared was becoming dangerously enamored of instigating social progress through government control.

This dualistic dynamic operated at the individual psychological level as well: Uncertainty generated tremendous anxiety, but it also allowed for free will. As Knight (1921) wrote, “We do strive to reduce uncertainty, even though we should not want it eliminated from our lives” (p. 238). A world without uncertainty would be a nightmare world dominated by Laplace’s demon, in which human intelligence and agency would have no meaning: “In a world so built that perfect knowledge was theoretically possible, it seems likely that all organic readjustments would become mechanical, all organisms automata” (Knight, 1921, p. 268). At the most fundamental level, then, uncertainty was quintessentially Knightian, the epitome of his intellectual style, forever pulling in two directions.

Despite the centrality of the concept to Knight and his work, “Knightian uncertainty” is often misunderstood—perhaps because of its nuance, but in part, I suspect, because, in his turgid 350-page book on the subject, Knight (1921) did readers the service of providing a pithy summation, in which he defined “uncertainty” in contradistinction to “risk”: “The practical difference between the two categories, risk and uncertainty, is that in the former the distribution of the outcomes in a group of instances is known (either through calculation *a priori* or from statistics of past experience), while in the case of uncertainty this is not true” (p. 233). This is the straightforward definition used not only by casual students of Knight, but also by those whom you would expect to be intimately familiar with his oeuvre. So, for example, Milton Friedman (as cited in LeRoy & Singell, 1987)—one of Knight’s students—wrote: “In his seminal work, Frank Knight drew a sharp distinction between risk, as referring to events subject to a known or knowable probability distribution, and uncertainty, as referring to events for which it was not possible to specify numerical probabilities” (p. 395). Unfortunately, this focus on probability obscures two key aspects of uncertainty, leaving it open to misinterpretation and criticism.

First, although Knightian uncertainty may have manifested in the absence of frequentist probabilities, its root cause was the absence of historical analogy—a crucial point because it holds the keys to future efforts to reduce uncertainty. Knight (1921) wrote that a situation of “risk” is one in which we are able to calculate a distribution either because it is a mathematical certainty—e.g., the odds of getting any given value in the roll of a die are 1 in 6—or because “statistics of past experience” allow us to infer the probability of an outcome. In other words, having encountered something similar before—or many similar somethings—we can use that experience to gauge the likelihood of a future outcome. In first encountering a situation, then, the question became to what class of events did it belong? According to Knight, the fundamental challenge for managers is that most business decisions are effectively *sui generis* and, as such, do not belong to any class of events. Without analogy, managers are faced with novelty, forced to operate without the guidance of probability. That means they must rely on judgment.

Second, the focus on the dichotomy between “risk” and “uncertainty” obscured the fact that, for Knight (1921), these concepts lay *on a spectrum* marked by “degrees of uniqueness” (p. 247). The uniqueness of a situation was a function of the ease with which one could find historical analogies and form a comparison class from which you could infer a probability. When you have situations with a low degree of uniqueness, you can find many similar instances and therefore easily construct comparison classes that enable you to calculate probabilities. That’s “risk,” and it is the province of things like insurance. When you have a high degree of uniqueness, you cannot do this, and so you get “uncertainty.” However—and this point is often overlooked in summaries of Knight—there is no clear dividing line between risk and uncertainty. Knight (1921) wrote that situations of true risk are rare because “entirely homogenous classification of instances is practically never possible” (p. 225). Conversely, instances of true

uncertainty are rare because “it probably never happens that there is *no* basis for comparison” (Knight, 1921, p. 226). So, the difference between risk and uncertainty is “a matter of degree only” (Knight, 1921, p. 225). In seeming paradox—much like the contemporary finding that light was both a particle and a wave—Knight characterized uncertainty as both discrete and continuous.

This continuum allows us to address two important criticisms of Knight. The first is that, in defining uncertainty as the inability to assign probabilities to future states of the world, Knight begged the question: He neglected to ask whether we can, in fact, anticipate all future states of the world. For example, Richard Zeckhauser (2006) writes: “The real world of investing often ratchets the level of non-knowledge into still another dimension [beyond ‘uncertainty’], where even the identity and nature of possible future states are not known. This is the world of *ignorance* [emphasis added]. In it, there is no way that one can sensibly assign probabilities to the unknown states of the world” (p. 2).⁹ However, while it is true that Knight did not formally establish a category for ignorance, he most certainly did include it in his conception of uncertainty. In writing that, while humans should not want to eliminate uncertainty from their lives, they nevertheless try to do so by predicting the future, Knight outlined five ways in which judgmental abilities may differ. He then noted: “For completeness we should perhaps add a sixth uncertainty factor, in the shape of occurrences so revolutionary and unexpected by any one as hardly to be brought under the category of an error in judgment at all” (Knight, 1921, p. 242). Modern readers might call these “black swans,” phenomena that cannot be imagined until they have actually been observed. But just as events are more or less unique, events are more or less

⁹ In a sign of just how confused the literature around Knight is, it is worth noting that other scholars refer to this category as “true uncertainty” or “Knightian uncertainty.” So, for example, Dharami and colleagues (2018) write: “A situation of true uncertainty (or Knightian uncertainty) arises when the outcomes and probabilities are unknown or unimaginable and objective/subjective estimates of these outcomes and probabilities are not available” (p. 8).

imaginable. So, while Zeckhauser points to the 9/11 terrorist attacks as an example of ignorance, the truth is that such attacks had, in fact, been imagined—at least to some extent by some people.¹⁰ Just as there are degrees of uniqueness, there are degrees of imagination.

This notion of degrees also deflates the chief criticism of Knight—the one that so reduced his influence in economics: the notion that he did not allow for subjective probability estimates. This is the basis of the criticism of Leonard Savage and other Bayesians, who claimed that, even if individuals did not or could not calculate frequentist probabilities, they acted *as if* they did so, thus preserving the all-important notion of rationality in economic behavior (Savage, 1954). As Daniel Ellsberg (1961) wrote in his classic paper on ambiguity—which, in effect, defended Knight by showing that his critics’ arguments did not hold up even on their own terms—“A number of sets of constraints on choice-behavior under uncertainty have now been proposed, all more or less equivalent or closely similar in spirit, having the implication that—for a ‘rational’ man—all uncertainties can be reduced to risks” (p. 645).

And yet Knight’s entire point about uncertainty is that it conjures “subjective” probability estimates.¹¹ Knight (1921) wrote that, in addition to the “objective” probabilities evoked by a priori mathematical reasoning or statistical inference based on aggregating classes of instances—that is, the two forms of “risk”—“uncertainty” evokes a “third type of probability judgment” (p. 231), though he complained that the word “probability” should be reserved for the products of

¹⁰ In *The 9/11 Commission Report*, the National Commission on Terrorist Attacks Upon the United States (2004) noted that the September 11, 2001, attacks “were a shock, but they should not have come as a surprise” (p. 2), by which the commissioners meant not only that there had been warnings of impending attack, but also that the idea of terrorists striking significant targets, like the Twin Towers, should not have been alien. After all, terrorists had bombed the World Trade Center in 1993, the intelligence community was aware of plots to crash airplanes into buildings, and Tom Clancy had even written a best-selling novel in which a pilot intentionally flies a jetliner into the Capitol.

¹¹ “We can also employ the terms ‘objective’ and ‘subjective’ probability to designate risk and uncertainty respectively, as these expressions are already in general use with a signification akin to that proposed” (Knight, 1921, p. 233).

formal statistical calculations. Instead, he referred to these subjectively derived judgments as “estimates,” which he argued were largely intuitive. Knight (1921) felt that most decisions were too unique to permit “any inference of value about any real probability” (p. 226). Nevertheless, he wrote, “it is true, and the fact can hardly be over-estimated, that a judgment of probability is actually made in such cases” (Knight, 1921, p. 226). If not, we could make no decisions whatever—“we could not live in the world at all” (Knight, 1921, p. 227). But, in such cases, we are acting upon “opinion” rather than “scientific knowledge” (Knight, 1921, p. 233).

It is hard to ask for a clearer recognition of subjective probability estimates and their centrality to decision-making. Indeed, “uncertainty” is *synonymous* with the formation of subjective probability estimates. Where Knight differed with his critics was in the value of such estimates, which he felt were prone to error. At the same time, Knight acknowledged that some estimates were better than others—this was the essence of the “judgment” that he thought managers needed in order to operate in the miasma of uncertainty surrounding business. He just did not know where good judgment came from. Because judgment was “unconscious,” it was “inaccessible to study.” He concluded: “The ultimate logic, or psychology, of these deliberations is obscure, a part of the scientifically unfathomable mystery of life and mind” (Knight, 1921, p. 227).

This mystery is where Knight left us. Following the first years of his career, he never revisited the topic of uncertainty or the judgment it demanded.¹² The furthest he would venture, in one of the few essays he wrote on business, was to write that all knowledge was based on

¹² In 1926, Knight did draft an outline for an economics textbook, in which he once again emphasized that uncertainty is a matter of degree (Chapter XI). But when it came to the topic itself, he seemingly had no interest in delving further. In the preface to the 1957 reissue of *Risk, Uncertainty and Profit*, Knight writes that he would change very little about the book: “In particular, no more elaborate theory of uncertainty would be offered. That would require a treatise on science and epistemology” (p. lxiii).

experience, suggesting that judgment, too, might be a function of experience—or at least that managers thought it was (Knight, 1922/2011b, pp. 7–10). And yet, in typical Knightian fashion, he wrote: “Here is a paradox: experience is the only source of knowledge, yet experience proves nothing” (Knight, 1922/2011b, p. 8). It is possible, he noted, to draw all sorts of erroneous conclusions, even superstitions, from one’s experiences.¹³ The question, then, was how to draw the *right* lessons from experience—how to distinguish correlation from causation, folk wisdom from truth. Here, Knight (1922/2011b) touted the power of science and, in particular, economics as the science of business: “The purpose of science, of economic science the same as any other, is not to go back of or beyond experience, but to get *more* experience and *representative* experience, so as really to test the case” (p. 43). Unfortunately, science was not up to the task. It turned out that one did, in fact, need to go “beyond experience.”

RAND

In the years after World War II, American scholars thought they would soon be able to codify and quantify human behavior. A quantitative push had invaded the social sciences—particularly economics—with many academics advancing the notion that humans obeyed natural laws in the same way that physical phenomena did. Similarly, managers embraced quantitative methods and the rationalist zeitgeist, institutionalizing corporate planning in vast departments designed to maximize efficiency and control. And a burgeoning cadre of civilian defense intellectuals seized on the successful wartime use of statistical methods to optimize military tactics as a way to replace the judgment of the professional soldier with the putative rationality of mathematical models. Across the academy, business, and the military, then, epistemological

¹³ On the relationship between experience and superstition, see Denrell (2008).

enthusiasm dominated a postwar search for order, yielding, it was claimed, a science of war, a science of management, and a grand theory of social life. Or at least that was the idea. The reality proved more complicated.

If one were to pick a U.S. institution that epitomized this rationalist approach to human affairs, it would be the RAND Corporation, the government-affiliated “think factory” formed in 1947 to keep scientists, who had played a key role in the war effort, involved in problems of Cold War national security. War, in the eyes of RAND’s scholars—many of them physicists, mathematicians, and economists—had too long been an “art,” and the new field of operations research, or OR, had given the Allies a taste of what a more “rational” approach could accomplish.¹⁴ The scholars at RAND wanted to develop a science of warfare that would put this rationality in place of military instinct and judgment, which Warren Weaver (as cited in Thomas, 2015), a RAND consultant who had run the U.S. government’s Applied Mathematics Panel during the war, derided as the “disorganized and feebly intuitive shadows of a real analysis” (p. 129). It is this attitude that has given RAND a widespread reputation as emblematic of the scientific hubris of the early Cold War—of rationalism run amok.¹⁵

The British had begun to develop OR just before World War II broke out when they realized that, while their radar had the technical ability to detect incoming German bombers, it did not perform so well in practice. In devoting more attention to the actual use of weapons, they pioneered a statistically driven approach to fighting—i.e., a scientific method of managing war, almost as if Frederick Taylor had been put in charge of military tactics (E. H. Kaplan, 2011, p. 33).

¹⁴ See, among others, Mirowski (1999).

¹⁵ See, for example, Erickson et al. (2013).

The Americans quickly adopted the technique. They had begun using statistics to improve military operations in 1942, when General Hap Arnold, commander of the Army Air Forces and the man who would ultimately champion creation of the RAND Corporation, realized that no one could tell him how many planes the United States had. So he created an outfit called Statistical Control, which sent officers to learn math at Harvard Business School, where their professors included a young Robert McNamara (Byrne, 1993). Statistical Control's first task was descriptive—to understand the Army Air Force's capabilities—but it soon turned to management problems, like the disparity between the number of planes and the number of pilots available to fly them. Finally, it tackled optimization problems—that is, issues of operations research—often with counterintuitive results. For example, in 1945, a study led by Frank Collbohm, who would spearhead RAND's establishment for Arnold and become its first director, showed that, contrary to conventional wisdom, B-29s would perform better by flying without armor because it would enable them to fly longer and strike more accurately (F. M. Kaplan, 1991, p. 57).

Because of OR's tactical victories, it did not seem unreasonable to think that similar methods could be applied to the conduct of war writ large. As John Williams (as quoted in Hounshell, 1997), who headed RAND's mathematics department, explained: "These successes with small, isolated components of the theory of warfare suggest the possibility of similarly treating the entire subject, and justify RAND in approaching it" (p. 243). This scaled-up version of operations research would be known as systems analysis, and its most dedicated adherents believed it could replace human judgment. Malcolm W. Hoag (1956), who worked in RAND's economics division, defined the new field this way: "By Systems Analysis we mean a systematic examination of a problem of choice in which each step of the analysis is made explicit wherever possible. Consequently we contrast Systems Analysis with a manner of reaching decisions that is

largely intuitive, perhaps unsystematic, and in which much of the implicit argument remains hidden in the mind of the decision-maker or his adviser” (p. 1). Systems analysis would thus plumb Knight’s “unfathomable mystery,” bringing judgment into the light so that it could be broken into its constituent parts and, preferably, quantified so that it could be subjected to mathematical calculation and optimized. In other words, judgment, that unconscious human faculty, could be rendered algorithmically.

In a January 1946 paper titled “Comments on a General Theory of Air Warfare,” Weaver (as cited in Jardini, 2013, p. 23–24) provided an almost comically bold metaphor for this approach. By way of analogy, he asked the reader to imagine warfare as the product of a “Tactical-Strategic Computer,” or TSC. The TSC’s processor was a black box—the article offered no actual algorithm—but Weaver wrote that the computer would be covered with control knobs, corresponding to the myriad variables that influenced air combat, from the uncontrollable (e.g., enemy capabilities and weather) to the controllable (one’s own choice of aircraft and flight path). The TSC’s operator could “twiddle the decision variable knobs” to alter the inputs and then push a “special button,” at which point “the Military Worth dial lights up and displays the numerical value of M.W.” (Thomas, 2015, p. 129). That was RAND’s rationalism in a nutshell: the incredible complexity of warfare could be distilled to quantified inputs, its outcome optimized by spinning a few dials that fed an inscrutable algorithm, yielding the “worth” of a war—whatever that meant.

Perhaps unsurprisingly, RAND’s attempt at a real-life TSC met with disaster. The organization’s first big systems analysis project was a study commissioned by the newly formed U.S. Air Force, its government patron, on how to most effectively use the atomic bomb against the Soviet Union. The man in charge of the project was Edwin Paxson, who had worked with

both Weaver and Williams on the Applied Mathematics Panel. At the same time, the Air Force had asked RAND to analyze the U.S. ability to repel Soviet bombers. An internal corporate memo (as quoted in Jardini, 2013) summarized RAND's mandate this way:

The pertinent factors comprising aerial offensive and defensive systems analysis must be identified, put in quantitative form, and the effect of their variation on the results established, in RAND's studies, which consider the interrelation of all these factors simultaneously. Such a systematic analysis compares alternative weapons systems to determine which is preferred, in the sense of yielding either a maximum payoff (in terms of utility or military worth) for a given expenditure of resources, or a given pay-off for a minimum expenditure of resources. Thus systems analysis seeks to cover the full-range of possible future weapons characteristics and simultaneously analyze each set of possible characteristics in all possible tactics and strategies of employment. (p. 31)

It is difficult to imagine a more ambitious test of an unproven methodology. The Air Force had asked RAND to devise nothing less than the strategy for a nuclear war and had couched it as an optimization problem. In doing so, RAND's scholars were not simply trying to cleanse themselves of intuition, but were seeking to banish the notion of uncertainty altogether—to burn off what Prussian General Carl von Clausewitz famously called the “fog of war.” Indeed, it was as if, with their pencil-and-slide-rule mentality, RAND's scholars thought they could achieve its opposite: the ideal state of *Fingerspitzengefühl*, a perfect awareness of the battle space.

In the end, it took more than pencils and slide rules to account for the astounding complexity of the problem. In their attempt to find the “one best way,” as Taylor might have put it, Paxson and his staff wound up modeling more than 400,000 different bomber configurations—a task so data intensive that RAND had to build a special computer to handle the calculations (Abella, 2008, pp. 60–61). And yet the effort failed miserably. Admittedly, their final report—“Comparison of Airplane Systems for Strategic Bombing,” delivered to the Air Force in September 1950—was, as historian David Jardini (2013) has written, “an intellectual

tour de force: Their report brimmed with elegant mathematical and economic analyses, graphs, charts, and optimization tables” (p. 33). The problem was that, in an attempt to develop a workable algorithm that maximized sorties while minimizing cost, RAND analysts had unrealistically simplified some variables (the Air Force would have to fly turboprop planes instead of its next-generation, jet-powered B-52), wildly misstated others (the United States did not actually have enough fissile material to build bombs for all these planes), and offended sensibilities by quantifying the unquantifiable (most egregiously, the value of a pilot’s life) (Jardini, 2013, pp. 33–34.). In effect, Paxson’s “optimal” nuclear war plan called for the United States to deploy an aging fleet of bomb-less bombers flown by expendable pilots. It is little wonder the Air Force blanched, and its rejection marked the end of RAND’s attempt to generate a theory of warfare and the beginning of a new respect for uncertainty.

Indeed, contrary to the institution’s reputation, when you start looking for uncertainty at RAND, you begin to find it everywhere, especially among the systems analysts and often in terms that are uncannily similar to Knight’s.

There is perhaps no better example than Charles Hitch, who was not only the head of RAND’s economics division, but also the president of the Operations Research Society of America (ORSA). In 1961, Secretary of Defense Robert McNamara—the man who made systems analysis the lingua franca of the Pentagon—recruited him to become the department’s comptroller on the strength of his book, *The Economics of Defense in the Nuclear Age* (Hitch & McKean, 1960), which was a treatise on how to efficiently allocate resources while maximizing national security. In short, you could not invent a person more steeped in the logic of quantification, calculation, and optimization. Yet even Hitch recognized that his work was rife with uncertainty. He dedicated his farewell address to ORSA to the subject, saying, “No other

characteristic of decision making is as pervasive as uncertainty”—after which he made the Knightian point that there was a distinction between “insurable risks” and “genuine uncertainties” (Hitch, 1960, pp. 437–438).

In other words, in the 1950s, at a time when faith in rationalism was ascendant, in the institution most dedicated to that faith, and among the people within that institution who were its most ardent followers, qualms about uncertainty flourished. Knightian uncertainty thus passed a sort of “crucial case test,” demonstrating just how hardy a creature it was. Following early missteps, RAND’s analysts would quantify where they could, but they would rarely fail to acknowledge the persistence of uncertainty and the attendant need for judgment. Yet recognizing the need for judgment still left the question of how to improve it—how to fill in those dark spaces that did not lend themselves to the light of mathematical analysis. Which is where Herman Kahn came in.

HERMAN KAHN

It is difficult to imagine two scholars more different than Frank Knight and Herman Kahn. Knight’s writing is filled with self-questioning and self-effacement. He outlined, drafted, and redrafted. By contrast, Kahn was an uncensored font of ideas, calculations, and anecdotes (some fabricated) that gushed forward in a torrent, captured by the tape recorders he wore around his neck and transmuted into printed words only by the younger collaborators he constantly kept around him. Kahn did not *write* books. His publications—when he bothered to finish them—were largely summaries of presentations.¹⁶ If Knight mimicked Socrates, Kahn foreshadowed PowerPoint, briefing audiences with multiple projection screens, abruptly cutting from one topic

¹⁶ On Kahn’s style, see Bruce-Briggs (2000), Ghamari-Tabrizi (2005), Kostelanetz (1968), and Schelling (1965).

to another, a stream of jokes livening the deadly seriousness of his material. Knight was focused inwardly on academe. Per Stigler (1973), “He was not a consultant to great or small bodies, whether public or private; he did not ride the lecture circuit; he did not seek a place in the popular press” (p. 519). Kahn did all of those things—and happily, joking to a *Life* journalist, “I am one of the ten most famous obscure Americans” (McWhirter, 1968).¹⁷ Where Knight was considered, Kahn was performative.¹⁸

The stylistic differences can make it hard to see the substantive similarities between the men. Despite his ebullient self-confidence, Kahn was deeply concerned, like Knight, with the role of uncertainty. Like Knight, he detested attempts to quantify the unquantifiable. And, like Knight, he agreed that uncertainty demanded good judgment, making the salient question, how to improve it. And that is where he truly differed from Knight: He provided an answer.

Much like RAND writ large, Kahn did not start out as an apostle of uncertainty. Quite the opposite. He had come to RAND as a mathematician, a physicist who had dropped out of Berkley’s doctoral program, and once there he quickly specialized in Monte Carlo analysis, a probabilistic approach to addressing problems that might be deterministic in nature but that were so unwieldy as to be unsolvable in practice. Mathematician Stanislaw Ulam explained Monte Carlo this way: Imagine that you wanted to know the odds of winning a game of solitaire. The traditional approach would be to calculate all the possible combinations of cards and determine the fraction that led to success, but that was an extremely involved combinatorial problem. A

¹⁷ One could make a case that Kahn and Knight were met in the paradoxical space of arcane influence. Despite several excellent sketches and the tremendous body of work by Ross Emmett, Knight lacks a major biography, and economics writers often fail to mention him in books on the field. Similarly, despite his notoriety, Kahn has only one—*The Worlds of Herman Kahn* by Sharon Ghamari-Tabrizi (2005)—plus a self-published volume, *Supergenius*, by Barry Bruce-Briggs (2000), a colleague and sometime collaborator.

¹⁸ For an impressionistic sense of what it was like to attend a Kahn performance, see Ghamari-Tabrizi (2005, Chapter 1).

more direct method might be to simply play, say, 100 hands and see how the games turned out (Eckhardt, 1987). He and John von Neumann subsequently used this technique to address what it would take for a chain reaction to reach critical mass—a problem that involved estimating the behavior of neutrons as they moved through fissile material. Neither theory nor conventional simulation could deal with a problem so complex, but one could sample the behavior of neutrons, particularly if one had a computer, which in the late 1940s they did with the JOHNNIAC (Galison, 1996).¹⁹ “Monte Carlo,” Kahn wrote, “is a method of getting answers when almost all else fails because the problem is so complex” (Kahn & Marshall, 1953, p. 267).

Monte Carlo was emblematic of work done at RAND during its early years—the smartest minds in the country using cutting-edge math and bleeding-edge technology to build new weapons and solve intractable defense problems—and Kahn was one of its leading practitioners. In 1953, he and Andrew Marshall—a former student of Knight’s who had also worked in the nuclear physics lab at the University of Chicago—published a paper (Kahn & Marshall, 1953) on reducing the sample size needed to run Monte Carlo simulations, thereby facilitating their use. This was a significant contribution, and Kahn began writing a book intended to be the definitive text on the subject. He finished a draft report for RAND (Kahn, 1956) before becoming bored with the project, finding it “tedious in the extreme” (Bruce-Briggs, 2000, p. 18). Later, in 1957, he would note that overuse of Monte Carlo was a “common pitfall” of modelers too enamored of a fancy quantitative tool: “A Monte Carlo problem done in a completely straightforward fashion is almost *prima facie* evidence of insufficient thought” (Kahn & Mann, 1957b, p. 11).

In his disillusionment, he parted with RAND’s physicists in the mid-1950s and joined its systems analysts. But, to Kahn, the purpose of systems analysis was not to banish judgment, but

¹⁹ “JOHNNIAC” stood for John von Neumann Numerical Integrator and Automatic Computer.

rather to refine it by replacing vagaries with specifics. What does, say, “strategic superiority” actually mean in terms of the number of nuclear weapons a country must have? By answering such questions, it was possible to transform “intuitive judgment” into “considered opinion” (Kahn & Mann, 1957a, p. 5). The former, Kahn wrote, was “essentially based on the individual’s experience and background. It is the basis of the day-to-day decisions of executives, businessmen, and in fact almost everyone. While it may be informed, the machinery by which it has been arrived at is not explicitly shown. It is essentially as good or bad as the man who is making it” (Kahn & Mann, 1957a, p. 5). By contrast, “the considered opinion ... differs from the intuitive judgment in that the logic behind the judgment is made explicit—this usually means that it is quantitative” (Kahn & Mann, 1957a, p. 5). The problem came when systems analysis fell prey to “Modelism,” preferring pretty abstractions to the complexities of the real world—much as in RAND’s early approach to scientizing war, which Kahn considered “flapdoodle” (Bruce-Briggs, 2000, p. 42). More generally, the goal of optimization, while perhaps appropriate for constrained operations research problems, was misguided when it came to strategic issues because, Kahn wrote, it “ignores the central role of uncertainty” (Kahn & Mann, 1957a, p. 157).

The problem of uncertainty began to consume Kahn, and in 1957 he and RAND colleague Irwin Mann published a series of papers that they intended as chapters for a book titled *Military Planning in an Uncertain World*. In a clear parallel to Knight’s work, Kahn distinguished “statistical uncertainty” from “real uncertainty” (Kahn & Mann, 1957b, pp. 9–16).²⁰ The former, Kahn wrote, “is the kind of uncertainty that pertains to fluctuation phenomena and random variables. It is the uncertainty associated with ‘honest’ gambling devices. There are

²⁰ It may be no coincidence that Kahn sounded like Knight. One of his acolytes was Andrew Marshall, with whom he had published the paper on Monte Carlo sampling. Marshall had been a student of Knight’s at the University of Chicago and was profoundly influenced by his distinction between “risk” and “uncertainty” (Augier, 2013; Krepinevich & Watts, 2015).

almost no conceptual difficulties in treating it—it merely makes the problems computationally more complicated” (Kahn & Mann, 1957a, p. 158).²¹ This was Knight’s “risk.” By contrast, Kahn wrote that real uncertainty “is the kind of uncertainty to which one might possibly assign subjective probabilities, but for which it is impossible to obtain general agreement on the numerical values of these probabilities. They are more a matter of taste than of calculation or investigation” (Kahn & Mann, 1957b, p. 13).²² This was clearly analogous to Knight’s “uncertainty” and his “third type of probability judgment.” But, unlike Knight, Kahn hinted at a solution: “There is no general recipe for handling Real Uncertainty,” he wrote, but analysts could try to limit it, to “decrease the area of uncertainty” (Kahn & Mann, 1957b, p. 14).

For postwar defense strategists, the problem of real uncertainty stemmed not only from the complexity of war generally, but from the revolutionary character of *nuclear war* specifically. Kahn (1965) framed the problem this way: “Despite the fact that nuclear weapons have already been used twice, and the nuclear sword rattled many times, one can argue that for all practical purposes nuclear war is still (and hopefully will remain) so far from our experience that it is difficult to reason from, or illustrate arguments by, analogies from history” (p. 134). As with Knight, then, the lack of analogy was the fundamental problem. One of the themes of his 1960 book, *On Thermonuclear War*, was the bright line separating the thermonuclear age from everything that had come before. The title was an obvious reference to Clausewitz’s *On War*, in which the Prussian general had famously noted: “War is an extension of politics by other means.” The nuclear revolution was revolutionary precisely because the threat of devastating retaliation had overturned that maxim, making war pointless. As Kahn’s colleague Bernard

²¹ Underlining in original.

²² Underlining in original.

Brodie (1954) had written several years earlier: “It is self-evident that national objectives in war cannot be consonant with national suicide” (p. 227).

Kahn, however, did not see things in such black-and-white terms. In the early years of the Cold War, it was not unreasonable to argue that the United States could use its atomic arsenal for political ends. For one thing, the United States had a nuclear monopoly until 1949, and even after the Soviets got the bomb, the arsenals on both sides were limited in quality and quantity, consisting of fission weapons that were delivered by bombers. It was thus possible to conceive of World War III as just a scaled-up version of the strategic bombing that had marked World War II. After all, the United States had destroyed plenty of cities with conventional weaponry before it bombed Hiroshima and Nagasaki.²³

The advent of the hydrogen bomb and new ways to deliver it changed that calculation—at least for most. But not for Kahn. He acknowledged that the move from kiloton-yield weapons to megaton-yield weapons marked a phase change. The former were big bombs. The latter were “comparable to gross forces of nature, such as earthquakes and hurricanes” (Kahn, 1960, p. 313). And, by the 1960s, with the development of intercontinental ballistic missiles, it became possible for the United States and the Soviet Union to destroy each other as functioning societies, regardless of who launched first. That meant that a nuclear war was not “fightable”—a state of mutual assured destruction existed, making deterrence the only sane strategy. As Brodie (1946) wrote, “Thus far the chief purpose of our military establishment has been to win wars. From now on its chief purpose must be to avert them” (p. 76). And yet Kahn rejected the conventional wisdom that a nuclear exchange need be a suicidal “wargasm,” as he memorably quipped (Ghamari-Tabrizi, 2005, p. 238).

²³ For an analysis of the U.S. destruction of Japanese cities by conventional weapons in comparison with the atomic bombs, see Wilson (2007).

This made a certain amount of sense: If the United States had to fight a nuclear war, it would be better to have options beyond launching the nation's entire arsenal in one genocidal salvo. But if nuclear war remained "fightable," then it represented the ultimate demand for judgment under uncertainty—the most extreme version of the problem Knight had posed. The uncertainty stemmed from the fact that no one had ever fought a nuclear war—there was simply no body of experience on which to draw.²⁴ And even more than the usual share of judgment was required because a war could escalate so quickly that the whole thing could be over—the world effectively destroyed—in a matter of hours. Although the systems analysts could do their best to transmute "intuitive judgment" into "considered opinion" by quantifying the quantifiable, the truth was that the conduct of a nuclear war was likely to come down to a series of decisions hastily made, under conditions of great uncertainty. The question of the day, then, was how to improve that judgment in the absence of experience.

Kahn's (1960) answer was "ersatz experience" (p. 416). That is, if the past could not provide analogy to guide judgment in the present, perhaps the imagined future could. It was essential, he wrote, to envision what a nuclear war would really look like—from initiation, to escalation, to defense, to termination, to recovery. His willingness to talk about such subjects—to "think about the unthinkable," as he put it in the title of a 1962 book—is what made Kahn a model for director Stanley Kubrick's iconic *Dr. Strangelove* (F.M. Kaplan, 1991). As Kahn (1960) wrote in *On Thermonuclear War*, before launching into a detailed description of what the

²⁴ Kahn made this point in a number of ways. In *On Thermonuclear War*, he wrote: "Nobody in the Department of Defense, including its senior members, can possibly have the kind of trained and tested intuition that is expected of a normal executive. There is no one with experience in the conduct of thermonuclear war" (Kahn, 1960, p. 162). And, when a member of the uniformed military questioned his credentials as a civilian to advise the Pentagon, he shot back: "Colonel, how many thermonuclear wars have you fought? Our research shows that you need to fight a dozen or so to begin to get a feel for it" (Bruce-Briggs, 2000, p. 51). Kahn is apparently not the only one to have made this point in this fashion. Alain Enthoven, another RAND analyst, is reported to have said, "General, I have fought as many nuclear wars as you have" (F. M. Kaplan, 1991, p. 254).

next *six* world wars might look like: “I am now going to ask the reader for an unpleasant feat of imagination ... to try to project himself into a future wartime situation” (p. 162). Alas, as Brodie (1959) had written years earlier, the imagination was “much too weak” (p. 162) to envision what a nuclear war would be like. What were needed, Kahn noted, were “propaedeutic and heuristic methodologies” (1965, p. xxiv)—or, more prosaically, “some strange aids to thought” (1962, p. 127). Two such aids were the war game and the scenario.

War games had been around for centuries and could take various forms—from the highly stylized to the hyper-realistic. But in the mid-1950s, the social scientists at RAND—partly in opposition to the mathematized simulations of the physical scientists and the economists—developed a free-form game that emphasized the importance of historical context and human judgment (Bessner, 2015). In 1955 and 1956, Herbert Goldhamer and Hans Speier ran four political-military games in which two teams engaged in scenario-based conflict. That is, players were dropped into a hypothetical future to pursue their interests against human competitors, whose behavior was judged by a human umpire, who added unpredictability by playing the role of “Nature.” Unsurprisingly, since they incorporated a high degree of uncertainty, these games did not “solve” a problem—they did not optimize a set of variables or illuminate the best way forward. To do that would require testing all the “branches” that could proceed from each decision made during the course of the game. This also meant that game results, unlike those of a laboratory experiment, were not replicable (Goldhamer & Speier, 1959).

But to Kahn (1962) war games “encouraged the development of several degrees of understanding” (p. 157). First, they could move a potential future out of the realm of ignorance if a player said, “It never occurred to me that the response to X could or would be Y.” Second, they could improve players’ intuitive assessments of a situation—that is, their judgment. “Finally, and

most significantly, one may learn something about a whole class of situations by amassing enough experiences with specific examples” (Kahn, 1962, p. 157). In other words, games could create classes of instances where none had existed. They could create analogy. Obviously, a game situation was not perfectly analogous to the real world, but Kahn maintained there was “nothing sacred” (Kahn & Mann, 1957c, p. 11) about total fealty to reality. “The important thing is to have enough of an analogue so that players feel they are playing roles instead of merely partaking in an elaborate conference. Nothing else is essential” (Kahn & Mann, 1957c, p. 11). Kahn agreed with Goldhamer and Speier that games were not predictive—“The reason for this is, first of all the obvious one: the future is uncertain” (Kahn & Mann, 1957c, p. 12).²⁵ But, “insofar as some parts of the future are more or less determined or even over-determined by existing constraints, a war game might be successful in exploring these constraints and, therefore, useful in predictions” (Kahn & Mann, 1957c, p. 12). In other words, war games could help bound uncertainty.

Unfortunately, war games were logistically challenging: “One of the major weaknesses of large minimum rule war games is that they tend to be so expensive in time and manpower that it is impossible to consider many variations of a scenario” (Kahn & Mann, 1957c, p. 13). But there was no reason a scenario—“some hypothetical sequence of events” (Kahn, 1962, p. 143) that served as the basis for the game—could not be constructed and considered on its own, for scenarios also substituted imagination for experience: “Imagination has always been one of the principal means for dealing in various ways with the future, and the scenario is simply one of the many devices useful in stimulating and disciplining the imagination” (Kahn, 1962, p. 145).

²⁵ Underlining in original.

Almost like a one-person war game, scenarios forced you to ask “what if?” and to construct a plausible (or even somewhat implausible) chain of events in your own head.²⁶

In 1961, Kahn left RAND and founded his own “think factory,” the Hudson Institute, where he put much of his energy into constructing scenarios, making them “a hallmark” of the organization’s work (Pickett, 1992, p. 8).²⁷ Indeed, the first grant that Hudson received funded research that ultimately became *On Escalation: Metaphors and Scenarios*, a book published in 1965 in which Kahn examined a plethora of ways in which conflict could escalate into nuclear war. Like games, scenarios were not supposed to be predictive, but rather they could be used “as artificial ‘case histories’ and ‘historical anecdotes’ ... to make up to some degree for the paucity of actual examples” (Kahn, 1966/2009, p. 195). Even if they were not as “experiential” as a role-playing game, Kahn nevertheless saw them as ersatz experience and argued that, especially in the nuclear age, the lessons learned from hypothetical futures could be more valuable than those learned from the past: “In some ways the unrealized and unexperienced, but historically plausible, problems of World Wars III and IV are more valuable than the experienced problems of World Wars I and II” (Kahn, 1960, p. 416). Scenarios, like games, could create classes of events where none existed, reducing uncertainty.

²⁶ Kahn’s scenarios resemble the sort of “informal game” that he mentioned in Kahn and Mann (1957c): “This is a conscious attempt to try to take account of the enemy’s reactions. It is sometimes played inside one man’s head. One simply asks himself ‘what would the enemy do if I did this,’ or ‘what does he think I will do if he does such and such?’” (pp. 3–4).

²⁷ For more on Kahn’s work on scenarios at the Hudson Institute, see Fosbrook (2017, Chapter 2).

CONCLUSION

The techniques of war-gaming and scenarios quickly made their way to management. Most famously, Royal Dutch/Shell developed its scenario-planning program after Pierre Wack attended a session with Kahn at the Hudson Institute (Kleiner, 2008). But the fundamental effect on managers came from a philosophical shift—a change in the epistemology and ontology of the future. In the postwar years, as in the time when Knight wrote *Risk, Uncertainty and Profit*, business scholars had embraced scientific management in an attempt to address the criticism that business was too reliant upon judgment. This can be seen in the rise of the MBA and efforts to inject more quantitative training into business education (Khurana, 2007). Strategy, it was argued, was a rational process of matching means to long-term goals (Chandler, 1962/2013), and so corporate planning departments—which by definition relied on prediction—spread to the point that John Kenneth Galbraith (1967) wrote of the rise of an expert managerial “technostructure.” According to Stephen Barley and Gideon Kunda (1992): “Planning, forecasting, and controlling were to be the manager’s watchwords” (p. 377). There was, in other words, a vision of the future as singular and knowable that comported with the optimization of operations research and the formalism of decision theory.

However, in an age of uncertainty, one could not simply plan for a future and assume that it would materialize. What Kahn and his more enlightened RAND colleagues were arguing was that, in complex situations, there could be no optimization because there was too much uncertainty. Per Knight, this amplified the importance of judgment. What Kahn and the others at RAND did with their games and scenarios was to provide what history could not. By imagining various futures and engaging in ersatz experience, they were probing the boundaries of the unknown, generating analogies that could be used to reduce degrees of uniqueness and therefore

the amount of uncertainty. This marked a significant step toward an answer to Knight's question of how we formulate strategy under such conditions—one that emphasized what would ultimately become known as the adaptability school, which held that strategy must be not only “deliberate” but “emergent” (Mintzberg & Waters, 1985).

Kahn and his colleagues essentially abandoned a singular ontology of the future for a plural one. The future became the futures. Why did that matter? If, given the novelty and complexity of the environment, strategists could not rely upon prediction, planning, and control, then they needed another way of coping with the uncertainty of the future. That is where games and scenarios came in. By illuminating hypothetical futures, they had the power to change mental models, and new mental models enabled the envisioning of even more hypothetical futures, forming a mind-expanding virtuous circle. The result was greater adaptability, such that when the future became the present, managers could accommodate it. The best way to deal with uncertainty, it turned out, was to embrace it.

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Essay 2

Strategic Foresight as Dynamic Capability

A New Lens on Knightian Uncertainty

ABSTRACT

This paper proposes to treat strategic foresight as a dynamic capability, providing a new theoretical lens on managerial judgment. Formulating strategy under uncertainty is a central challenge facing the modern firm. Analogy is thought to help managers make sense of novel situations through comparison to past experience. However, from a Knightian perspective, uncertainty precludes analogy because such situations are unique. Even if one relaxes this conclusion, acknowledging “degrees of uniqueness,” analogy remains an unreliable guide because it triggers biases that encourage the adoption of difficult-to-change hypotheses about the future. Nevertheless, analogical reasoning suggests how managers might better respond to uncertainty. This paper argues that, just as we learn from the past by imagining counterfactuals, so too can we learn from the future by simulating experiences—a process that reduces bias and renders us more perceptive, flexible, and adaptable to environmental change. That is the premise of strategic foresight methods like scenario planning, yet such methods have struggled to find theoretical purchase in the general management literature. Noting that the basis of strategic foresight aligns with the microfoundations of dynamic capabilities, this paper integrates research on individual decision-making with firm-level perspectives to suggest a new theoretical approach to managerial judgment under uncertainty.

INTRODUCTION

The fundamental challenge facing managers is how to make strategic decisions given the uncertainty of the future. One managerial response is the use of analogy, which reduces the effect of uncertainty by casting the unfamiliar in light of past experience (Gavetti et al., 2005). Scholars have argued that analogy has many salutary effects: It facilitates strategic change by linking the past, present, and future (Kaplan & Orlikowski, 2013); it helps firms attain superior positions by rendering managers mentally flexible enough to see opportunities that are under-competed because they are difficult to perceive (Gavetti, 2012); and it provides the ability “to identify a superior course of action ... and foresee its consequences” (Gavetti & Menon, 2016, p. 207). In short, uncertainty triggers analogy, thereby enabling superior managerial judgment.

This argument would have seemed backward to Knight (1921), whose seminal distinction between “risk” and “uncertainty” rested on the limits of analogy. Knight argued that, if a thing behaved in a certain way under certain circumstances, then we could expect a similar thing to behave in a similar way under similar circumstances. The key question was: What things were like each other—what classes of things existed? To Knight, “uncertainty” stemmed from the fact that most things in the business world were unlike, thereby preventing the calculation of probabilistic “risk.” Although he acknowledged “degrees of uniqueness,” he wrote that most business decisions are effectively *sui generis* (Knight, 1921, pp. 231, 247), requiring skilled managers. To Knight, uncertainty signaled a shortage of analogy, thereby *necessitating* superior managerial judgment.

The purpose of this paper is to make a third argument: Uncertainty, although it signals an insufficiency of analogy, can *stimulate* superior managerial judgment. To the extent that managers use analogy predictively (e.g., Gavetti et al., 2005, p. 693; Lovallo et al., 2012, p. 496),

they implicitly accept a conception of the future as singular and knowable—that is, if a past situation resembles a present one, they expect to see a similar outcome. But treating the future as plural and less knowable can, in theory, make managers more sensitive to changes in the present, reduce overconfidence in specific courses of action, and render mental models more flexible, thereby improving adaptability to whatever future does manifest. In other words, managers can profit by leveraging the uncertainty of the future (Schoemaker, 2002), which is epistemologically murky and ontologically plural.

That is the premise of strategic foresight methods like scenario planning (e.g., Schwartz, 1991; van der Heijden, 1996; Wack, 1985a, 1985b), where “strategic foresight” refers *not* to the ability to perceive a particular, beneficial future (cf. Gavetti & Menon, 2016), but rather to a process of thinking about the future so as to better sense, shape, and adapt to emerging events (e.g., Rohrbeck et al., 2015; Slaughter, 2002; Tsoukas & Shepard, 2004a). Despite widespread corporate adoption of tools like scenario planning (Rigby & Bilodeau, 2015), strategic foresight methods have struggled to find purchase in the general management literature (Rohrbeck et al., 2015) and therefore lack an agreed-upon theoretical justification (Bouhaleb & Smida, 2018). As one review noted: “Some attempts to build conceptual foundations can be observed, but in general, we found no single perspective that deserves loyalty on which a coherent theoretical foundation of strategic foresight is built” (Iden et al., 2017, p. 87).

This gap is puzzling, harmful, and unnecessary. It is puzzling given the importance that scholars have long accorded managerial conceptions of the future (e.g., Fayol, 1916/1949). It is harmful because it impedes an understanding of whether, how, and under what conditions particular foresight methods might work. And it is unnecessary because the assumptions and purported benefits of strategic foresight dovetail with the assumptions and requirements outlined

in the literature on dynamic capabilities (Teece et al., 1997). Like strategic foresight, that work is grounded in a recognition of Knightian uncertainty, and it holds that managers must be forward-looking in their ability to sense change, to seize opportunity, and to reconfigure assets so as to adapt to rapidly changing environments (Teece, 2007).

In this paper, I maintain that we may measure the degree to which strategic foresight aids the formulation of strategy under uncertainty by the extent to which it supports the “microfoundations” of dynamic capabilities (Teece, 2007). Specifically, strategic foresight will bolster sensing, seizing, and reconfiguring to the extent that it prompts managers to consider a range of alternative futures, thereby preventing them from prematurely settling on a focal hypothesis (Koehler, 1991). I draw on the heuristics-and-biases literature regarding judgment under uncertainty (e.g., Kahneman et al., 1982) to develop theory about the workings of strategic foresight, and I draw on the dynamic capabilities literature to establish benchmarks for judging strategic foresight’s utility in making strategy under uncertainty. I therefore address the role of cognition in dynamic capabilities (Helfat & Peteraf, 2015) by linking research in psychology and strategy (Felin et al., 2015) and blending individual- and firm-level analysis (Whetten et al., 2009) in an attempt not simply to fill a gap in the literature, but to address the fundamental question of how to improve managerial judgment.

KNIGHTIAN UNCERTAINTY AND STRATEGIC RESPONSES: A REVIEW

Even though, in its purest form, a predictable future would render humans mere automatons unwinding in a clockwork universe, humans find the uncertainty posed by the unknowability of the future so unnerving that we go to great lengths to avoid it. As Knight (1921) wrote, “We do strive to reduce uncertainty, even though we should not want it eliminated

from our lives” (p. 238). This section reviews strategies to reduce uncertainty and to show how those efforts, like Knightian uncertainty itself, reflect particular beliefs about the nature of the future.

Knightian Uncertainty

In *Risk, Uncertainty and Profit*, Knight (1921) wrote: “The practical difference between the two categories, risk and uncertainty, is that in the former the distribution of the outcomes in a group of instances is known (either through calculation *a priori* or from statistics of past experience), while in the case of uncertainty this is not true” (p. 233). Understandably, scholars therefore tend to characterize Knightian uncertainty as the inability to assign probabilities to a known set of possible outcomes,¹ as though the concept of Knightian uncertainty were simply a challenge to the neoclassical assumption that people are rational decision-makers with full information—“bounded rationality” (Simon, 1947) *avant la lettre* (Rakow, 2010). Knight certainly did intend to push back against the notion of *homo economicus* (Emmett, 2009), but this characterization neglects the deeper philosophical underpinnings of Knightian uncertainty.

To Knight (1921), uncertainty stemmed from capitalism’s orientation toward the future—the fact that managers have to make bets about tomorrow without full knowledge of it: “At the bottom of the uncertainty problem in economics is the forward-looking nature of the economic process itself” (p. 237). Because he saw business situations as largely *sui generis*, Knight (1921) argued that past experience precluded a clear look at the future, and as a result, managers had to exercise judgment—they had to form an opinion about “the future course of events” (p. 233).

¹ Some scholars also define Knightian uncertainty as the inability to imagine all possible outcomes (e.g., Alvarez et al., 2018), but this view is less common among economists. For example, Zeckhauser (2006) has explicitly argued that Knightian uncertainty does not encompass the failure to imagine all future states of the world—a condition he dubs “ignorance” (p. 2).

Economic competition was therefore a struggle among such opinions, and profit stemmed from the fact that some were more accurate than others.

Embedded in this analysis are beliefs about epistemology (how much we can know about the future), ontology (whether the future is single and predetermined or plural and undetermined), and human agency (the extent to which we can control or even create the future). Knight believed that the universe was fundamentally indeterminate and therefore that the future was opaque (Foss, 1993). This indeterminateness was not only the result of randomness, but a function of human consciousness, which, as Boudreaux and Holcombe (1989) put it, “severs any rigid connection between the present and the future” (p. 145). In other words, free will gave people the ability to shape the future: “Knight emphasized human creativity in an economic universe that is basically open-ended in its possibilities” (Foss, 1993, p. 270).

Uncertainty was therefore not simply a function of capitalism; it was essential for capitalism to function. Knight argued that, if all outcomes were probabilistically knowable, profits would be competed away because the optimal course of action would be apparent to all. Firms could operate on autopilot: “In a world so built that perfect knowledge was theoretically possible, it seems likely that all organic readjustments would become mechanical, all organisms automata.” With the introduction of uncertainty, however, the chief questions became “what to do and how to do it” (Knight, 1921, p. 268).

Responses to Uncertainty

Various approaches to strategy address these questions differently, but all share the objective of reducing uncertainty. Consider the following three strategic approaches to uncertainty—planning, learning, and enacting—and the philosophical assumptions of each.

Planning. The planning approach to strategy contends that firms are best served by formalized, rational processes that articulate long-term objectives and the means to achieve them (Ansoff, 1965). As Chandler (1962/2013) wrote: “Strategy is the determination of the basic long-term goals and objectives of an enterprise and the adoption of courses of action and the allocation of resources necessary for carrying out these goals” (p. 13). The planning approach takes an epistemologically aggressive view of the future, treating it as relatively predictable. After all, if there were no predictability to the future, plans would serve no purpose.

Amid the relative economic stability of the 1950s and 1960s, many firms developed large planning and forecasting units to maximize efficiency and control (Galbraith, 1967)—an effort that jibed with the notion that an organization should operate mechanistically amid relative placidity (Burns & Stalker, 1961/1994). Indeed, the planning approach could be seen as an extension of Taylor’s (1911) scientific managerialism, which had resurged after World War II as an outgrowth of operations research, statistical methods the Allies had used successfully to optimize military tactics (Ansoff, 1965). As Barley and Kunda (1992) wrote of the rationalist zeitgeist, “Planning, forecasting, and controlling were to be the manager’s watchwords” (p. 377).

Learning. In contrast, advocates of the learning school contended that prediction was a “fallacy” that assumed the world would “hold still while a plan is being developed and then stay on the predicted course while that plan is being implemented” (Mintzberg, 1994, p. 110)—a criticism that became more salient as environmental turbulence increased in the 1970s (Grant, 2003). Instead, they focused on the present, when the future had made itself known. Their favored strategy was thus one of adaptability through short-term feedback and incremental response. Taken to its logical extreme, such a strategy was no strategy at all, but rather ad hoc improvisation (Mintzberg & McHugh, 1985) or simple serendipity (Pascale, 1984).

The prescriptions of the learning school mesh with the predictions of organizational scholars. Cyert and March (1963) emphasized that firms “avoid the requirement that they correctly anticipate events in the distant future by using decision rules emphasizing short-run reactions to short-run feedback rather than anticipation of long-run uncertain events” (p. 167). Weick (1969) wrote that organizations make decisions “in terms of localized disturbances to which abbreviated analyses will be applied, with short-term recommendations as the result” (p. 10). Lawrence and Lorsch (1967) noted that if an organization is getting constant feedback from a turbulent environment, it will focus on the short term and its search will be local. In the literature on exploration versus exploitation, which may be read as a contest between future needs and present competencies, exploitation dominates because its “returns are positive, proximate, and predictable,” whereas the wages of exploration are “uncertain, distant, and often negative” (March, 1991, p. 85).

Enactment. The planning and learning approaches to strategy thus differ largely along epistemological lines. What firms do depends on how much they think they can know. Yet future uncertainty is also a matter of ontology. Is there only one future, or are there multiple possible futures? Is the future predetermined, or can firms influence it? To the extent that firms have influence, are they simply choosing among preexisting alternatives, or can they create options? Both the planning and learning schools imply a monistic view of the future, in which firms position themselves in the strategic landscape but have little ability to construct it (Wiltbank et al., 2006). This conception leaves no room for entrepreneurship (Felin et al., 2014), but, as Schumpeter (1911/2002) argued: “Passively ‘drawing consequences’ is not the only possible economic behaviour. You can also try and change the given circumstances” (p. 406). Firms, we might say, are not simply “future takers”; they are also “future makers.” Entrepreneurs create

rather than simply discover possibilities (Alvarez & Barney, 2007) and therefore can enact their environment (e.g., Hamel & Prahalad, 1994).

Residual Uncertainty

Firms need not pursue these strategies in pure form—hence Mintzberg and Waters’ (1985) argument that strategy should be both “deliberate” and “emergent”—but each has its flaws. Successful long-term planning requires accurate prediction (Makridakis, 1996), but long-term prediction is difficult in complex domains (Tetlock, 2005), such as business, where the determinants of performance are poorly understood (Rosenzweig, 2006) and the rapid feedback that enables learning (Kahneman & Klein, 2009) is elusive. Adaptation thrusts the firm into a reactive posture (Brown & Eisenhardt, 1998), leaving it vulnerable to “predictable surprises” (Bazerman & Watkins, 2008) and “success traps” (Levinthal & March, 1993, p. 106), whereby it efficiently produces widgets but is vulnerable (and possibly blind to) the next widget-usurping innovation that comes along. Meanwhile, enactment requires the ability both to predict and to adapt: A firm must accurately forecast its ability to shape the future while preparing to adapt to the parts of the future it cannot or does not try to shape.

Which raises a fundamental problem: No strategy can eliminate uncertainty. Indeed, to the extent that a firm reduces, or avoids, or controls uncertainty, it is not actually addressing Knight’s challenge of how to make strategy under uncertainty. This point might seem to risk tautology—that is, any strategy that successfully manages uncertainty cannot, by definition, be a strategy for dealing with uncertainty—but no matter how successful a firm is in planning, or adapting, or enacting, it will face some amount of residual uncertainty.

We thus return to Knight’s (1921) original questions: “what to do and how to do it” (p. 268). That is, how do firms make strategy under uncertainty given the need for managerial

judgment? These were questions for which Knight himself had no answer. Management, he wrote, was an “art,” not a “science,” and given the opacity of the future, strategy was a “delusion” (Knight, 1923/2011, p. 52). The sources of good judgment, meanwhile, were hopelessly opaque—“a part of the scientifically unfathomable mystery of life and mind” (Knight, 1921, p. 227).

Modern scholars have tried to be more constructive. Foss and Klein (2012), for example, have hypothesized that “judgment is rooted in *skills* for handling uncertainty” (p. 80–81), noting that “skills are, of course, accumulated through experiential learning” (p. 94). It is therefore fitting—though ironic, given Knight’s definition of uncertainty—that one of the more robust literatures on cultivating managerial judgment touts the benefits of analogizing from experience.

THE PROMISE AND PERIL OF ANALOGIES, REAL AND IMAGINED

Analogy is often considered the foundation of human cognition, the “fuel and fire of thinking” (Hofstadter & Sander, 2013). The comparison and categorization of experiences is the fundamental way in which we make sense of uncertainty, and Knight (1921) himself agreed that “all reasoning rests on the principle of analogy” (p. 204). Without analogy, every situation would be utterly novel, giving us no sense of what to expect next.

This predictivity is a core function of analogy. As Hume (1748/2000) put it, “From causes, which appear *similar*, we expect similar effects” (p. 31). The more precise the analogy, the greater the foresight it ostensibly affords: “There can be no doubt that every such resemblance which can be pointed out between B and A, affords some degree of probability, beyond what would otherwise exist, in favour of the conclusion drawn from it” (Mill, 1843, p. 99). In theory, then, analogical reasoning is probabilistic—the greater the similarity between two

situations, the more likely their outcomes will be the same—which is why scholars of analogy stress the importance of finding analogies with deep structural similarities (e.g., Gentner, 1983). But individuals are not intuitive statisticians (Kahneman & Tversky, 1973), and they tend to use a single analogy to generate a single course of action (Dubin & Lovallo, 2008).

The purpose of this section is to critically examine the use of backward-looking analogies (i.e., those derived from experience) as a tool for improving managerial judgment, while suggesting that forward-looking analogies (i.e., those constructed by imagination) may be useful.

Experience as a Source of Judgment

Analogy has become central to the study of management, both because it is thought to describe how managers actually make decisions and because it is thought to describe how they should make decisions (Gavetti et al., 2005).

From a descriptive standpoint, analogy is how managers make sense of novel and complex situations: “When faced with a new and complex setting, managers identify the features of the setting that seem most pertinent, think back through their experiences in other settings with similar features, and recall the broad policies that worked well in those settings” (Gavetti et al., 2005, p. 693). This description has several noteworthy characteristics. First, analogy operates through simplification: Managers identify the underlying characteristics of the situation that are most germane, which enables them to bring a complex situation within the bounds of managerial cognition. Second, it is backward-looking: Managers comb history—whether their own experiences or those of others—to determine a putatively apt comparison to the present situation. Third, analogy is predictive: If managerial actions taken in the past turned out well, similar actions in the present are expected to do the same.

The normative case for analogy rests on this last point. Simulations have shown that analogies with the greatest fidelity between past and present yield the best performance (Gavetti et al., 2005, p. 708). Good analogy not only provides an accurate model of the strategic landscape—thereby improving performance (Gary & Wood, 2011)—but it also renders managers mentally flexible enough to recognize “cognitively distant” opportunities that are under-competed because they are difficult to perceive (Gavetti, 2012, p. 269). Analogies enable managers to “change their worldview” (Gavetti, 2012, p. 269) so that they can see superior opportunities—superior opportunities being complex and therefore difficult to deduce via first principles (Rivkin, 2000) but easier to see via associative reasoning. Finally, analogy provides the ability “to identify a superior course of action ... and foresee its consequences” (Gavetti & Menon, 2016, p. 207). Strategists who can determine why past situations produced success may generate insights that they can apply to a present situation (Gavetti, 2012). Thus, uncertainty prompts analogy, which improves managerial judgment.

From a Knightian perspective, however, analogy cannot be a solution to uncertainty because uncertainty is defined as the absence of analogy. Granted, Knight (1921) said that few situations were entirely unique or entirely common: Situations of true risk are rare because “entirely homogenous classification of instances is practically never possible,” and conversely, instances of true uncertainty are rare because “it probably never happens that there is no basis for comparison” (p. 227). The distinction between “risk” and “uncertainty” is “a matter of degree only” (Knight, 1921, p. 227). Nevertheless, he did not believe that such similarities alone could form the basis for anticipating the future. That demanded judgment.

Even if one sets aside Knight’s particular definition of uncertainty, the nature of managerial problems undercuts arguments in favor of analogy. For example, it is unclear how

analogy can serve as a method for understanding “novel” situations, given that something new, by definition, lacks antecedent. Even if we relax our definition of “novel”—and acknowledge “degrees of uniqueness”—we are left with the problem of “complexity.” Analogy entails simplification, but difficult-to-imitate courses of action are complex (Rivkin, 2000), making it hard to see how analogy can lead to superior strategy. And if the world is becoming ever more volatile, uncertain, complex, and ambiguous (Schoemaker et al., 2018; Stiehm, 2002), this problem will only become more salient. Ironically, as the world becomes less like the way it was, we will find ourselves drawing ever more comparisons with the past. Finally, the more turbulent the environment, the more important the ability to switch mental models rapidly in order to keep pace with reality. Analogy is not well-suited to this need: Although analogies are characterized as a means to more flexible mental models (Gavetti, 2012), they are, in fact, incredibly sticky, persisting even in the face of disconfirming evidence (Vinokurova, 2012). Analogies may not only be wrong—they may be persistently wrong.

To be fair, proponents of analogy urge caution. For example, Gavetti and Rivkin (2005) write, “Dangers arise when strategists draw an analogy on the basis of superficial similarity, not deep causal traits” (p. 57). But analogizing on the “right” dimensions of a problem is far more difficult than generally recognized. For one thing, there is too little past experience—that is, history—on which to draw, and our familiarity with it is limited. The more uncertain a situation—that is, the greater the “degrees of uniqueness”—the greater the demand for analogy, but the smaller the supply. As March and colleagues (1991) put it, “The paucity of historical events conspires against effective learning” (p. 1). The difficulty in determining causality further impairs the ability to learn from experience. One cannot rerun past events to test hypotheses under controlled conditions (Shafer, 1980), so we are faced with the “ambiguities of experience”

(March, 2010). Finally, history is highly contingent, undergoing sudden phase changes for seemingly minor reasons with surprising results (Ferguson, 2010). In the past there were multiple possible futures, many of which were separated by the thinnest of circumstantial membranes (Cowley, 2000; Ferguson, 1999). We simply live in the past future—that is, the present—that happened to manifest. To be truly useful, then, an analogy would therefore have to account for the fidelity not only between the past and the present, but between the past’s possible futures and the present’s possible futures (March et al., 1991)—an impossible task.

That said, discarding analogy as a managerial tool would seem both infeasible (humans reason analogically) and undesirable (absent comparison to past experience, every situation would be novel). How, then, can managers leverage analogy’s utility while avoiding its pitfalls?

Imagination as a Source of Judgment

Part of the problem is that executives tend to base their thinking on a single analogy (Gavetti et al., 2005)—a tendency that has been replicated in laboratory studies (Dubin & Lovallo, 2008)—so one solution might be to prioritize a *breadth* of analogies, as opposed to the *depth* of a single analogy. True, if uncertainty is marked by the absence of analogy, then demanding multiple analogies as the solution to the problem with single analogies is nonsensical. But analogies need not come only from experience of past events; they may also come from imagination of future situations. That is, the way to reconcile the problem with analogies may lie not in unearthing better ones but in constructing more of them. As March has noted, in order to learn from “samples of one or fewer” (March et al., 1991), it is “probably necessary to supplement the data of history with the data of virtual experience” (March, 2010, p. 117).

Admittedly, “supplementing the data of history” requires us to accept that learning can be a function of imagination, and organizational scholars have traditionally seen learning as a

function of environmental feedback (e.g., Cyert & March, 1963) or experience (e.g., Levitt & March, 1988). But much of what we learn from experience is, in fact, a function of imagination—of considering counterfactuals—because only by asking what the world would look like if a certain event had not happened are we able to determine whether it made a difference (Tetlock & Belkin, 1996).

If learning from experience is based on imagination—on the construction of alternative pasts—then it is not unreasonable to think that we may also learn from imagined futures. Indeed, as Seligman and colleagues (2016) have written, it may be prospection—the ability to envision alternative futures—that enables wisdom. Humans routinely engage in “mental time travel,” a process by which we not only consciously recall past events, but also project ourselves into the future (e.g., Suddendorf & Cornballis, 2007). Neuroscientists have found “striking similarities” between the brain’s mechanisms for remembering the past and for imagining the future (Schacter et al., 2012, p. 677). For example, one study found that subjects with memory loss due to hippocampal damage also had difficulty describing potential futures, suggesting a link between the way the brain processes experience and imagination (Hassabis et al., 2007).² And children only develop the ability to imagine futures once they have developed the ability to remember experiences (Busby & Suddendorf, 2005).

Just because the brain conceives of the past and the future in similar ways does not necessarily mean that we can learn from an imagined future. But the purpose of thinking about the future is to change motivation and behavior in the present (Suddendorf, 1994). Indeed, from an evolutionary standpoint, the ability to mentally construct futures and adapt accordingly may

² Interestingly, Knight (1921) foreshadowed these findings when he wrote, “Prophecy seems to be a good deal like memory itself, on which it is based” (p. 211). He also noted the similarity between real and imagined experience: “Scientifically, we can analyze the mental content into sense data and imagination data, but the difference hardly exists for consciousness itself, at least in its practical aspects” (Knight, 1921, p. 203).

account for human survival and flourishing as a species (Dawkins, 2000). Brain imaging shows that, in constructing visions of the future, humans recombine elements from memories to fashion something new (Schacter et al., 2007). We can then “backcast” to ascertain possible causes of that future, based on our existing mental models of how the world works. In doing so, we may change what we see and do in the present. Differences between what we expect to see and what we actually do see—that is, errors in expectation—enable learning (Seligman et al., 2016), which is to say new mental models. The new experiences and the changed mental models in turn enable us to hypothesize different alternative futures, forming a mind-expanding feedback loop (Suddendorf & Busby, 2003).

The idea that we can learn from imagined futures is not alien to management scholars. If we learn, in part, through trial and error, then imagined futures can be considered a sort of “ideational trial and error” (Felin & Zenger, 2009, p. 133). This is similar to the point Gavetti and Levinthal (2000) make about the strategic value of “cognitive search.” Building on Emirbayer and Mische’s (1998) writing about the sources of agency, Kaplan and Orlikowski (2013) explain: “The future is not a set of outcomes that can be forecast more or less accurately or that will be revealed over time. Instead, the future is manifest in the multiple imaginings of what might be possible” (p. 966). Those multiple imaginings, in turn, render us more cognitively agile, able to adapt to the future that does manifest (Weick & Sutcliffe, 2015).

Nor is the notion alien to business. Herman Kahn, a Cold War defense intellectual who noted that the revolutionary nature of nuclear weapons made it difficult to reason by historical analogy, pioneered the use of imagined futures to inform strategy (Kahn, 1960; Kahn, 1965). Kahn’s answer was to create “ersatz experience” (1960, p. 416) via “strange aids to thought” (1962, p. 127), like scenarios that could serve “as artificial ‘case histories’ and ‘historical

anecdotes' ... to make up to some degree for the paucity of actual examples" (1966/2009, p. 195). The use of scenarios then jumped to business (Fosbrook, 2017) in the early 1970s via Kahn's contact with Pierre Wack, a Royal Dutch/Shell executive, who used scenarios to explore the potential for major changes in the Arab world, a process that ostensibly enabled Shell to survive the 1973 oil price shocks (Kleiner, 2008; Wack, 1985a, 1985b). This marked the birth of scenario planning as a strategic tool for managers.

Despite this lineage, scenario planning—the formalized process of generating and considering scenarios—lacks theoretical grounding. Much like strategic foresight, of which it is an example, scenario planning has received little attention in the general management literature (for reviews, see Chermack et al., 2001; Varnum & Melo, 2010), and some of that attention concerns method, not theory (Lempert et al., 2006; Schoemaker, 1995). The few scientific studies of scenario planning disagree markedly about its effects, particularly whether it increases or decreases overconfidence (Kuhn & Sniezek, 1996; Meissner & Wulf, 2013; Phandis et al., 2015; Schoemaker, 1993; Tetlock, 2005, Chapter 7). The paucity of theory regarding scenario planning—and strategic foresight generally—makes it difficult to generate testable hypotheses and produce knowledge. Indeed, given its similarity to analogy, there is reason to believe that it might suffer the same flaws. What we need is a theoretical framework by which to judge strategic foresight methods.

THEORIZING ABOUT ANALOGY AND STRATEGIC FORESIGHT

In this paper, I argue that strategic foresight tools will aid the formulation of strategy under uncertainty by the extent to which they support the microfoundations of dynamic capabilities. Specifically, I theorize that they will do so to the extent that they facilitate an open

and pluralistic conception of the future—an ability that can be highlighted via contrast with analogy, which encourages a more closed and monistic conception of the future. In order to make this argument, I must first address why the consideration of multiple futures would be superior to a single future, especially given that a tool, like scenario planning, relies on the same mechanism as analogy—the comparison of like events (real in the case of analogy, and imagined in the case of scenario planning). In this section, I address that puzzle by proposing theory about the weaknesses of analogy and the strengths of strategic foresight.

The Psychological Basis of Analogy

The use of analogy can encourage a mental model that persists in the face of evidence to the contrary (Vinokurova, 2012), and poor mental models undermine effective strategy (e.g., Tripsas & Gavetti, 2000). We can find one explanation for this effect in the work on heuristics and biases (e.g., Kahneman, 2011; Kahneman et al., 1982), which suggests that analogies evoke many biases that degrade judgment (cf. Bazerman & Moore, 2013, pp. 219–221).

Chief among these may be explanation bias (Ross et al., 1977), which holds that, when individuals are asked to explain an outcome, they come to believe it is more likely. Koehler (1991) explains the mechanism behind this phenomenon, arguing that the explanation becomes a “focal hypothesis” that triggers an assumed-to-be-true frame of reference, whereby disconfirmatory evidence is ignored or given less weight than data that supports the hypothesis. I suggest that the process of generating analogy triggers explanation bias in managers because the purpose of comparing the present to the past is to identify and justify a course of action. The analogy thus becomes a focal hypothesis, and overconfidence—a pervasive judgmental bias (Moore & Healy, 2008)—increases as the plausibility of the hypothesized analogy is backed up by ostensibly confirming evidence that may or may not have diagnostic value (e.g., Wason,

1960). What's more, a decision-maker searching for an analogy may rely on ease of recall—that is, it may trigger availability bias (Tversky & Kahneman, 1973). Managers may settle on analogies that are more notable for standing out than they are for holding up, meaning that both the inductive process of analogy-generation and the deductive process of hypothesis-testing are biased.

Another way of looking at analogy would be to say that analogists fall prey to the representativeness heuristic, substituting the judgment that one situation *resembles* another for the judgment that one situation *is like* another—and therefore will behave similarly—even if, in doing so, they privilege dubious evidence or commit statistical sins, such as ignoring base rates (Kahneman, 2011; Kahneman & Frederick, 2002; Kahneman & Tversky, 1973). Indeed, situations of Knightian uncertainty epitomize the law of small numbers (Tversky & Kahneman, 1971). By definition, a unique situation is not representative of a larger population, yet managers often use a single point of comparison in the past to infer the likelihood of a particular future. Similarity is not irrelevant, but analogy degrades judgment insofar as it substitutes an easier question (“Does this business look like a successful business?”) for a harder one (“Will this business succeed?”). As Steinbruner (1974, p. 115) has argued, analogy is a device by which decision-makers substitute simple comparisons for complex problems.

Analogy to past experience also triggers hindsight bias (Fischhoff & Beyth, 1975) and takes advantage of the human penchant for narrative. Using historical analogy, we infer a detailed story about the future, even though each of those details, while making the story more plausible, makes it less probable because it involves a greater number of factors that must happen in conjunction (Kahneman & Tversky, 1983; Tversky & Kahneman, 1982). “Adding details to a good story increases plausibility, yet at the same time decreases probability” (Koehler, 1991, p.

510). Historical analogy magnifies the effect of “outcome knowledge.” As Tetlock and Belkin (1996) write, “Once people learn the outcome of an event, they not only perceive that outcome as more likely ex post than they did ex ante ... they often fail to remember their ex ante assessment of what was and was not likely to happen” (p. 15). The past comes to be seen as inevitable (March, 2006, p. 208), and the future comes to be seen as predictable (Kahneman, 2011, p. 218).

Some scholars maintain that emphasizing the need for structural similarity in analogies can offset certain cognitive biases, such as availability (Gavetti & Rivkin, 2005). Yet, logically speaking, the better the analogy, the stronger the focal hypothesis and the weaker the search for disconfirmatory evidence. Trying to debias by carefully considering a single analogy may, ironically, exacerbate the problem.

Strategic Foresight as Antidote

I theorize that strategic foresight methods may improve judgment under uncertainty because, by encouraging consideration of multiple futures, they disrupt the tendency to prematurely settle on a focal hypothesis. This is the same logic behind the debiasing effects of “considering an alternative” (Fischhoff, 1982). As Soll, Milkman, and Payne (2014) note: “One of the most successful debiasing techniques for tackling narrow thinking is to instruct people to look at a problem they face in another way” (p. 931)—that is, to “think of the opposite” or to “look at it differently.” This body of research shows that entertaining multiple possibilities can reduce overconfidence and hindsight bias, both of which I have implicated in the problems with analogy. Perhaps most importantly, as Koehler (1991) has argued, considering an alternative breaks the “inertia” prompted by adopting a particular frame of reference, thereby renewing the search for disconfirmatory information. Per Hirt and Markman (1995), the act of considering an alternative forces individuals to “undo their prior explanation for the event and construct an

explanation supporting a different outcome” (p. 1071), opening them to plausible alternatives and to evidence that might support those alternatives.

There is also research that adds a temporal dimension to the consideration of alternatives—most notably, the work on counterfactuals (for reviews, see Epstude & Roese, 2008; Roese & Olson, 1995). Although Kahneman and Tversky (1982a) considered the simulation heuristic a bias and although research shows that counterfactual thinking can exacerbate certain judgmental errors, such as hindsight bias (Roese & Olson, 1996), other work has found that considering counterfactuals can reduce confirmation bias by making individuals aware of alternatives. Notably, Galinsky and Moskowitz (2000) found that, when asked to judge whether an individual was an extrovert, subjects primed to consider counterfactuals asked more hypothesis-disconfirming questions. Extending this finding, Kray and Galinsky (2003) found that priming counterfactual thinking encouraged the search for disconfirmatory evidence and improved subsequent decision quality in the Carter Racing case (Brittain & Sittkin, 1986), which is based on the space shuttle Challenger disaster. Although the literature on considering alternative futures is smaller, it too finds that considering alternatives can improve judgment, by reducing overconfidence (Hirt et al., 2004; Hirt & Markman, 1995).

A different, but complementary, line of research finds that considering a breadth of analogies improves judgment by encouraging managers to take the “outside view” instead of the “inside view.” Whereas the inside view encourages individuals to treat each situation as unique, the outside view encourages them to consider their situation as an example of a broader class of similar situations (Kahneman & Lovallo, 1993). This more statistically grounded approach prompts more accurate predictions (e.g., of the time it will take to complete a project) than the inside view, which encourages excessive optimism and overconfidence—a dynamic that extends

to strategy-making. In one study, Lovallo and colleagues (2012) found that private equity investors who generated a reference class (Kahneman & Tversky, 1982b) of analogous cases (Gilboa & Schmeidler, 1995) were better able to take the outside view and, as a result, generated superior returns. Other research has shown that use of multiple analogies improves predictive accuracy (Green & Armstrong, 2007), and that better forecasters search out analogies that disconfirm as well as confirm their hypotheses (Tetlock, 2005, p. 92).

Constraints on the Future

Theorizing that any simulation of multiple futures offsets the judgmental biases inherent in analogy would be simplistic. An “anything could happen” approach to the future is neither accurate (there are things that can be predicted, and there are constraints on the possible), nor useful (simply positing that “anything could happen” does nothing to bound uncertainty or to increase adaptability in the face of residual uncertainty).

In fact, considering an overabundance of futures can backfire. Given the task of generating explanations for hypothetical future events (Hirt et al., 2004; Hirt & Markman, 1995), subjects who were asked to generate two alternatives displayed less bias, but those asked to generate eight displayed more. The ease of generating two alternatives implied that there were plausible alternative outcomes, whereas the difficulty of generating eight implied the implausibility of alternatives, thereby reinforcing the focal hypothesis and increasing overconfidence. (A similar biasing effect occurs when subjects are asked to generate many explanations for counterfactual events [Sanna et al., 2002].) What’s more, Hirt and Markman (1995) found, “Participants asked to explain subjectively plausible alternative outcomes showed debiasing, whereas those asked to explain subjectively implausible alternative outcomes

maintained their belief in the focal hypothesis” (p. 1084). Thus, a theory of strategic foresight requires more granular treatment of how to consider the future.

One idea is that the future may be ontologically open but epistemologically closed—which is to say, there may be many possible futures but they are limited by facts. This idea draws on Searle’s (1995) notion of social ontology, whereby meaning has both a subjective and an objective component. For example, although the nature of a \$20 bill is ontologically subjective (i.e., it has value only because people believe it has value), it is an objective fact that it can be traded for goods and services (Searle, 2006). The notion that we can “learn from the future” has a whiff of the fantastical about it. But, contra some popular accounts, scenarios are not useful if they are “crazy” (“Why It’s Worth Reading,” 2019). In constructing futures, we must defer to reality.

The notion that the future is simultaneously open and closed can also be found in the “adjacent possible” (Kauffman, 2000, Chapter 7), a concept that entrepreneurship scholars have borrowed from biology to illustrate where new ideas come from. Biologists explain novelty in part as a function of random mutations that are selected for their fit with the environment. But, as Felin and colleagues (2014) explain, organisms may evolve characteristics that are not necessary adaptations to the environment but that nonetheless turn out to be useful. For example, the lungfish developed the swim bladder, which helps it maintain buoyancy, because water entering the fish’s lungs prompted a biological response. Importantly, the lungfish did not need the ability to regulate buoyancy; rather, the bladder’s functionality became apparent only *after* its appearance. The key here is that, although the swim bladder’s utility existed a priori, it could not have been anticipated—and that its development was constrained by the nature of the organism and its environment. It constituted an adjacent possibility, a function of both variation and

constraint. Randomness is not unrestricted but rather “highly canalized” (Felin et al., 2014, p. 277).

One can apply this notion of possibility and constraint to objects, organizations, and—for the purposes of this paper—the future itself. It is obviously not possible to state all potential future states of the world a priori. Yet the present will only evolve—or, given human agency, be pushed—into spaces that are nearby, even if they cannot be identified in advance. As Johnson (2010) summarized: “The adjacent possible is a kind of shadow future, hovering on the edges of the present state of things, a map of all the ways in which the present can reinvent itself. ... It captures both the limits and the creative potential of change and innovation” (p. 31). Strategic foresight methods are managerial tools for exploring the adjacent possible, with a respect for reality defining the canals that guide thought.

STRATEGIC FORESIGHT AS DYNAMIC CAPABILITY

One theoretical tool for understanding how firms maintain competitive advantage amid rapid change—that is, how they make effective strategy under uncertainty—is the literature on dynamic capabilities (Teece et al., 1997), which maintains that, in high-velocity environments, firm performance does not rest solely on the possession of difficult-to-imitate assets, as maintained by the resource-based view of the firm (Penrose, 1959; Wernerfelt, 1984), but rather the ability to reconfigure those assets (Teece et al., 1997). A dynamically capable firm is both responsive to its current environment (Helfat et al., 2007) and forward-looking (Teece, 2007), investigating the future and attempting to shape it (Teece et al., 2016). Specifically, dynamic capabilities to cope with the emerging future rest on three microfoundations: sensing, seizing, and reconfiguring (Teece, 2007).

Therefore, I argue that we may measure the degree to which strategic foresight tools enable strategy under uncertainty by the extent to which they support the microfoundations of dynamic capabilities. Further, I maintain that such tools will do so by the extent to which they support a pluralistic conception of the future. Contra analogy, which recommends a specific course of action, strategic foresight does not indicate *what* to think but, rather, *how* to think. This distinction echoes the argument that dynamic capabilities do not by themselves constitute firm strategy but that they must be congruent with it (Schoemaker et al., 2018, p. 18; Teece et al., 2016, p. 18). Indeed, dynamic capabilities lend themselves to a theoretical framework for strategic foresight both because they, too, are grounded in a recognition of Knightian uncertainty (Teece et al., 2016, p. 15) and because, in a case of supply meeting demand, the purported benefits of strategic foresight (attuning managers to their environment, reducing overconfidence in specific courses of action, and rendering mental models more flexible) match the needs of dynamic capabilities (sensing, seizing, and reconfiguring).

Taking each microfoundation in turn, in this section I first establish that we can consider strategic foresight a dynamic capability. Because that confluence alone is not a sufficient basis for asserting strategic foresight's utility, I then use the theoretical arguments from the previous section to show how the debiasing effects of considering multiple futures could strengthen the firm's ability to sense, seize, and reconfigure. I also raise potential limits to strategic foresight that become apparent when viewing it as a dynamic capability.

Sensing. The first microfoundation of dynamic capabilities is the ability to *sense* opportunities and threats in the environment, requiring “perception” and “attention” (Helfat & Peteraf, 2015, p. 838), which dovetails with strategic foresight's emphasis on developing “peripheral vision”—the ability to better sense impending change in uncertain environments

(Day & Schoemaker, 2004; Day & Schoemaker, 2005). In fact, Tsoukas and Shepard (2004b) define strategic foresight largely in terms of sensing: It is “the organizational ability to read the environment—to observe, to perceive—to spot subtle differences” (p. 140). And dynamic capabilities scholars themselves have noted: “Scenario planning can aid generative sensing. It can be an important internal tool for managing uncertainty and facilitating rapid response to new exigencies” (Teece et al., 2016, p. 22).

We may therefore say that strategic foresight aids strategy-making under uncertainty when it improves sensing. And, using insights from the heuristics-and-biases literature, we may theorize that it does so by embracing a pluralistic conception of the future: When managers consider alternative futures, they are more likely to seek out disconfirmatory evidence. Seen another way, considering alternative futures prompts managers to take the outside view, which exposes them to a broader class of events.

At the same time, ontological pluralism might constrain sensing. Considering too many futures can not only encourage reversion to a focal hypothesis as discussed earlier, it can also result in a deluge of information and organizational neurosis (Day & Schoemaker, 2005). There is also evidence that considering too few futures—specifically a single, unlikely alternative—can backfire, as explanation bias inflates probabilities (Tetlock, 2005, Chapter 7). From an organizational point of view, managers may disagree about what constitutes a “plausible future,” and as Kahneman (as quoted in Tetlock, 2005) has said, “The impossible sometimes happens and the inevitable sometimes does not” (p. 189). Finally, managers cannot watch for things they have not thought of. This is why Neustadt and May (1986) wrote: “The future may surprise. It surprises because something in the present, hard to see, weakens the past as a guide” (p. 261).

Unfortunately, our ability to recognize the future import of current events is limited (Risi et al., 2019). We see many inflection points that do not exist and miss many that do.

Seizing. The second microfoundation of dynamic capabilities is *seizing*, the ability of firms to take advantage of nascent opportunities, which requires flexibility in physical plant and organizational structure. Like sensing, seizing is commensurate with the goals of strategic foresight generally and scenario planning specifically. Wack (1985b), the Shell scenario planner, wrote that the consideration of scenarios was intended to cultivate an entrepreneurial mind-set and invigorate managerial recognition of “strategic openings” (p. 150). Just as Knight argued that uncertainty was a precondition for entrepreneurship, Wack (1985b) wrote: “Scenario planning aims to rediscover the original entrepreneurial power of foresight in contexts of change, complexity, and uncertainty. It is precisely in these contexts—not in stable times—that the real opportunities lie to gain competitive advantage through strategy” (p. 150).

We may say that strategic foresight aids strategy-making under uncertainty to the extent that it encourages seizing, and we may theorize that it does so by making alternative futures more salient, mitigating availability bias and reducing overconfidence in the likely success of any given plan. Additionally, by encouraging them to take the “outside view,” the consideration of multiple futures helps managers avoid the pitfalls of the “planning fallacy,” whereby individuals tend to underestimate the time and cost of projects (Buehler et al., 1994).

Companies that have considered an array of futures are less likely to lock themselves into single, possibly difficult-to-reverse, courses of action. Indeed, strategic foresight enables managers to better navigate the nonlinear relationship between the uncertainty of the future and the irreversibility of decisions (Ghemawat, 2016). The challenge of seizing lies in identifying the best course of action. Although strategic foresight can give firms a greater awareness of

possibilities, managers nevertheless need to commit to organizational structures and invest in capabilities. Because strategic foresight does not purport to be predictive, it emphasizes adaptability, but adaptability has its limits, which is why Mintzberg and Waters (1985) noted that strategy must be both “deliberate” and “emergent.” Strategic foresight reduces but does not necessarily resolve the tension of those competing demands and may therefore need to be supplemented with a more concrete approach, such as that presented by real-options theory (for a review, see Trigeorgis & Reuer, 2017).

Reconfiguring. *Reconfiguration* is the ability to recombine assets and restructure the organization so as to match the environment (Teece, 2007). As Helfat and colleagues (2007) point out, reconfiguration requires managers to reorganize both the firm’s tangible and intangible resources. Such “asset orchestration,” in turn, can require the ability to persuade managers to change the way they see the world, an effort that may encounter resistance (Helfat and Peteraf, 2015). The ability to shift one’s mental models—and those of others—is another of the purported benefits of scenario planning. As de Geus (1988), a Shell scenario planner, put it: “The companies that succeed will be those that continually nudge their managers towards revising their views of the world” (p. 74). Wack (1985b) characterized his early efforts at scenario planning as exercises in changing the managerial “microcosm” (p. 140).

We may thus gauge the utility of strategic foresight by its ability to unstick mental models, and we may theorize that it does so by discouraging the premature adoption of a focal hypothesis and by encouraging the consideration of disconfirmatory evidence—by breaking the “inertia” that Koehler (1991) described via consideration of alternative futures. Indeed, managers who embrace strategic foresight’s fundamental premise—that the future is marked by irreducible

uncertainty—should display less overconfidence in their existing mental models. But that is a proposition that requires further study.

We must also consider the organizational determinants of foresight’s ability to shift mental models. On the one hand, the interactive nature of strategic foresight exercises like scenario planning may facilitate strategic change, providing a social mechanism for doing the “temporal work” that can help resolve differences among organizational actors (Kaplan & Orlikowski, 2013), for resolving the cognitive and political competition among strategic frames that occurs in times of uncertainty (Kaplan, 2008), and for providing the social interaction that can fuel the origination of novel strategies (Felin & Zenger, 2009). On the other hand, managers can conduct foresight exercises in such a way as to reinforce an organizationally predetermined outcome. Ideally, strategic foresight tools serve as “liberating structures” (Torbert, 1991), encouraging low-risk exploration of potential strategies. But strategic foresight can run aground if a particular future is central to an organization’s identity or managerial agenda. Zenko (2015) recounts the U.S. military’s Millennium Challenge exercise, a war game that officials conducted so as to reinforce, rather than challenge, beliefs about the future effectiveness of U.S. forces. Thus, as with sensing and seizing, strategic foresight can fail to deliver on its promises.

SUMMARY AND DISCUSSION

In this paper, I addressed the question of how to cultivate the managerial judgment necessary to make strategy under uncertainty. Whereas some scholars have proposed the use of analogy as an answer, I argue that analogy triggers individual-level biases that degrade judgment, encouraging managers to prematurely adopt a focal hypothesis and reject disconfirmatory evidence. Analogy thus draws on and reinforces a monistic conception of the

future that is inappropriate in rapidly changing environments. By contrast, I maintain that the consideration of alternative futures, which is the hallmark of strategic foresight, suppresses those biases, discouraging adoption of a focal hypothesis and preserving a pluralistic view of the future that attunes managers to their environment, reduces overconfidence in specific courses of action, and renders mental models more flexible. In this, strategic foresight constitutes a dynamic capability, and the literature on dynamic capabilities can in turn provide standards by which to judge the effectiveness of strategic foresight efforts. In this paper, I have responded to a call from researchers who consider the lack of theory undergirding strategic foresight a “lost opportunity” that hinders both scholars and practitioners (Rohrbeck et al., 2015, p. 2).

My argument rests on certain epistemological and ontological notions, and it is important to question those notions. In particular, it is worth interrogating this paper’s definition of foresight not as the ability to predict the future but rather as a way of considering the future that assumes most of it cannot be predicted. But that is not the way that the field has traditionally defined foresight (e.g., Fayol, 1916/1949; Whitehead, 1933/1967). There is obviously significant organizational advantage to spotting the actual future before it materializes. It is therefore worth considering to what extent foresight *should* be about anticipating the future, which of course is a function of our ability to actually do so. Here, we must take note of research that has been pushing the boundaries of prediction in the service of judgment. Most notably, by participating in a multiyear forecasting tournament run by the Intelligence Advanced Research Projects Activity, a U.S. agency, a team of scholars at the University of Pennsylvania demonstrated that it is possible to improve the accuracy of geopolitical forecasts (Mellers et al., 2014; Tetlock & Gardner, 2015). Given the high degree of uncertainty in international affairs, this suggests that we can, in fact, reduce irreducible uncertainty, challenging more pessimistic epistemologies.

Just as there is reason to question whether prediction can offer so little, it is worth questioning whether foresight can offer so much, because there are few empirical studies on the debiasing effects of considering alternative futures, especially as compared with the abundant research on counterfactuals. Although, as explored earlier, there are neuroscientific reasons to believe that individuals treat the future much as they treat the past, psychology suggests that they treat judgments about the past differently than they treat judgments about the future (e.g., Fischhoff, 1975). Additionally, some studies on alternative futures deal with the future (“what will happen”) while some deal with the future perfect (“what will have happened”)—a distinction that could be important because the former involves aleatory uncertainty and the latter involves epistemic uncertainty, which can affect judgment (Fox & Ülkümen, 2011; Tannenbaum et al., 2015).

What’s more, the literature on counterfactuals is far from unanimous in finding that counterfactuals debias decision-making. For example, Galinsky and Moskowitz (2000) found that subjects encouraged to think about different possible pasts were better able to consider alternatives in the present, such as solutions to the Duncker candle problem, but that they performed worse on the Wason card task. It is possible that the effect of considering multiple pasts operates along multiple pathways. Much as accountability is a complex construct that can encourage individuals to either hedge or double down on hypotheses depending on the circumstances (for a review, see Lerner & Tetlock, 1999), the consideration of temporal alternatives may sometimes decrease bias and sometimes increase it.

The decision-making literature is also conflicted about whether people naturally consider multiple futures. Kahneman and Tversky (1982a) maintained that simulation was automatic. But various studies indicate that it is not (Glucksberg & Weisberg, 1966; Hirt & Markman, 1995;

Snyder & Swann, 1978), and the tendency to settle on a focal hypothesis (Koehler, 1991) suggests prediction of a single future. Indeed, Galinsky and Moskowitz (2000) argue that simulation requires stimulation: Experimenters must prompt subjects to consider alternatives (Wegner & Bargh, 1998). That said, once primed to consider alternatives, subjects will spontaneously—but consciously—generate alternatives additional to those they were asked to produce (Hirt et al., 2004). The consideration of alternative futures may be like that of counterfactuals—both automatic reflex and controlled process (Roese et al., 2005). And there may be individual differences in the tendency to consider alternative futures, much as individuals differ in their tendency to consider counterfactuals (Roese & Olson, 1995).

Meanwhile, the literature on prospection (Gilbert & Wilson, 2007), which decision-making scholars seem to ignore, maintains that individuals automatically consider alternative futures. Seligman and colleagues (2013) write: “Generating simulations of the future can be conscious, but it is typically an implicit process—not requiring conscious initiation or monitoring, often not accessible to introspection, and apparently occurring spontaneously and continuously” (p. 126). Nevertheless, they argue that prospection enables goal-setting and therefore impacts behavior in the present. Maintaining this ability to conceive and choose among alternate futures constitutes the faculty we think of as free will. By contrast, Fukukura and colleagues (2013) note that experimental research, by its very nature, embraces determinism and that prospection and its effects “may happen reflexively and with little awareness” (p. 148). This raises “the interesting question of what necessary function traditional conscious processes serve as people think about and simulate the future” (Fukukura et al., 2013, p. 148). That philosophical question is beyond the scope of this paper, but simulating the future can contribute to management, improving judgment and the formulation of strategy under uncertainty.

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Essay 3

Always Ready

Strategic Foresight in the U.S. Coast Guard

ABSTRACT

The fundamental challenge facing managers is how to make strategic decisions given the uncertainty of the long-term future. Managers often respond to this uncertainty by focusing on the (more predictable) short term, trading exploration for exploitation and failing to achieve the ambidexterity necessary for organizations to survive and thrive over time. In this interview- and archive-based qualitative study, I examine how the United States Coast Guard ameliorated this persistent problem through a scenario-based planning process that used far-future narratives to help leaders identify robust long-term strategies. I find that by providing a structure for confronting uncertainty, this strategic foresight effort—initially known as Project Long View and later known as Project Evergreen—enabled the Coast Guard to attend more to the future while maintaining or even improving operational effectiveness in the present. I suggest that Long View and Evergreen made the organization more ambidextrous, and that it did so by reconfiguring mental models such that managers began to perceive short-term demands and long-term needs as complementary rather than competing. Managers became more tolerant of paradox by adopting a nonlinear perception of time—one in which imagined futures influenced present actions, which then revised imagined futures, and so on. Significantly, Long View and Evergreen helped the Coast Guard adapt to a dramatic expansion of its mission following the September 11, 2001, terrorist attacks. The Coast Guard changed the way it “makes a living,” suggesting that we might consider strategic foresight a dynamic capability. However, dynamic capabilities are path-dependent, costly, fragile, and experience-based. By contrast, the Coast Guard effort was novel, thrifty, persistent, and cognitive. This study thus concludes by introducing the notion of “scrappy foresight,” in which imagination is a valuable but inexpensive strategic resource that organizations can leverage to better sense, shape, and adapt to the future.

INTRODUCTION

On the morning of September 11, 2001, hundreds of thousands of people found themselves trapped in Lower Manhattan. Anyone south of the burning chaos that was Ground Zero could not head uptown, and officials had closed the bridges and tunnels that connected the island to New York's outer boroughs and New Jersey. The only way out was by water. So over the next hours, an impromptu flotilla—of ferries, tugs, private craft, fire and police boats—took clusters of people from the wreckage of the World Trade Center to safety across the water. Although many vessels operated of their own initiative, a significant part of the evacuation was directed by the United States Coast Guard, which issued a call for “all available boats” and coordinated the debarkation. The result was an effort that reminded many of the storied British evacuation across the English Channel of several hundred thousand troops whom Nazi forces had trapped on French shores in 1940. It was an “American Dunkirk” (Kendra & Watchtendorf, 2016).

The Coast Guard is an unusual organization—a military service that also serves as a regulatory, intelligence, and law enforcement agency—whose mission has undergone several major evolutions since Alexander Hamilton (1787) first suggested its establishment in *Federalist No. 12*. The modern Coast Guard has diverse responsibilities—from fisheries protection to port security—and it is marked by a profoundly operational culture. Its lifeblood—reflected in its motto, *Semper Paratus*, or “Always Ready”—is its ability to respond and adapt, often in ad hoc fashion. As Admiral James Loy, who led the service from 1998 to 2002, said of the September 11 evacuation: “The direction was being provided by young Coast Guard officers from Staten Island that just happened to be on whatever platform they were standing on, kicking ass and

taking names and directing traffic and pulling off this unbelievable debarkation from Manhattan” (LaGrone, 2014).

The Coast Guard’s efforts on September 11 epitomized, in dramatic fashion, the organization’s ability to respond quickly and effectively amid chaos—i.e., to *exploit* its existing competencies. From a theoretical perspective, however, far more interesting is the way in which the Coast Guard’s actions following September 11 showcased the payoff of a radical *exploratory* effort that Loy had begun three years earlier to reorient the organization toward the long-term future. Most notably, he had commissioned a scenario-planning exercise, Project Long View, based on the premise that the Coast Guard faced “a startlingly complex future operating environment characterized by new or unfamiliar security threats” (U.S. Coast Guard [USCG], 1999a, p. 1). Such uncertainty required a new approach to strategy, so the exercise generated five possible far-future worlds—several of which incorporated the possibility of increasingly severe terrorist attacks on U.S. soil—and formulated 10 strategies that would enhance the service’s operational capabilities in any of them. In the aftermath of the attacks, the Coast Guard’s mission shifted radically, but those strategies helped it adapt to disruptive change.

How to make strategy under uncertainty is the central question organizations face. Given that the future is the chief source of uncertainty and given that “strategy” is usually defined as long-term, the central question facing organizations is actually more specific: How to formulate strategy given the uncertainty *of the long-term future*? Unfortunately, because both private- and public-sector organizations tend to focus on the short term and because of the deleterious effects this is thought to have, scholars sometimes transmute this question into: “How can organizations attend more to the long-term future?”—a formulation which implies that the key problem in strategy formation is the amount of attention firms pay to the future as opposed to the nature of

that attention. As a result, amid the wealth of research on strategy development, there is little scholarship on *how* organizations might attend to the uncertainty posed by the long-term future, as opposed to simply *how much* they attend to it.

One exception is the research on strategic foresight, defined here not as the ability to perceive a particular future, but rather as the process of considering multiple possible futures so as to better sense, shape, and adapt to emerging events. Strategic foresight methods, such as scenario planning, are intended to render participants' mental models more flexible and encourage development of more robust strategies, thereby improving resilience in the face of uncertainty and change. But strategic foresight lacks theoretical grounding in the management literature (Rohrbeck et al., 2015). Research on the use of imagined futures to inform present action is largely confined to futures journals, where, in spite of (or because of) the tremendous quantity of articles, no agreed-upon theoretical justification has emerged (Bouhalleb & Smida, 2018; Iden et al., 2017). This situation inhibits scholarly insight and practitioner improvement, making strategic foresight ripe for qualitative inductive study.

The United States Coast Guard presents an interesting case for such study because its strategic foresight efforts are well-respected and because it has traditionally epitomized short-termism. A highly operational and resource-constrained organization, it has prided itself on reactivity even at the expense of strategy, making it an unlikely candidate to initiate a strategic foresight effort. What's more, its strategic foresight program grew at a time—the years after 9/11—when its operational responsibilities increased markedly, which could have suggested the need for less focus on the long-term future, rather than more. This makes the Coast Guard a kind of crucial-case test: If it could develop a highly functional foresight capability, then it is plausible that many organizations could. The question is how? How, under such conditions, did the Coast

Guard address the question of how to think about the future—and what impact did its efforts in this regard have?

In this paper, I investigate the inception, execution, and (unlikely) persistence of Project Long View and its successor, Project Evergreen—a quadrennial scenario-planning exercise that provided a structured way for managers to think about Coast Guard strategy amid the uncertainty of the long-term future. In other words, I detail how one organization addressed the “how” question—and how its approach affected strategy. In doing so, I find that strategic foresight can help resolve several outstanding issues in management scholarship—including the persistence of short-termism, the paradox of organizational ambidexterity, and the challenges of dynamic capabilities—and that those issues, conversely, can serve as theoretical lenses through which scholars can frame and evaluate strategic foresight efforts.

THEORETICAL BACKGROUND

Despite a sense that firms should aim to create long-term value (Porter, 1992), many firms privilege the short term over the long. For example, in order to meet quarterly earnings expectations, CEOs may forgo projects that have a positive net present value (Graham et al., 2005). Such behavior has prompted decades of concern among American scholars and practitioners about the wages of “short-termism” and its effect on the U.S. economy (e.g., Dimon & Buffett, 2018; Drucker, 1986). And, although debate persists on the extent of short-termism and its dangers (Lavery, 2004; Rahmandad et al., 2016), researchers have demonstrated a positive relationship between long-termism and performance (Barton, Manyika, Koller, et al., 2017; Barton, Manyika, & Williamson, 2017). Indeed, one recent study finds that, if companies

were more oriented toward the long term, they could reap an additional \$1.5 trillion in return on invested capital (Mirchandani et al., 2019).

The situation in the U.S. government is no better—and perhaps worse. Scholars have studied the bias for the present in a slew of policy domains—from the budget to infrastructure to climate change—and politicians lament that decisions made today are doing a disservice to future generations (e.g., Obama, 2014). Meanwhile, a raft of think-tank reports—from the Aspen Institute (2016), the Brookings Institution (Galston & Kamarck, 2015), the Progressive Policy Institute (Ritz, 2018), the McKinsey Global Institute (Barton, Manyika, Koller, et al., 2017), the National Research Council and the National Academy of Public Administration (2010), and many others—has cataloged damage done by short-termism. The tendency to discount the future not only reduces economic performance, threatens the environment, and undermines national security—to name but a few consequences—it also leaves the United States vulnerable to surprise and limits its ability to respond to crises, a failing on stark display in early 2020 as the nation struggles to combat the COVID-19 pandemic after underinvesting in its public health infrastructure.

Researchers highlight various causes of short-termism in the private sector. Those who focus on market forces cite investor priorities, executive compensation, shareholder activism, and earnings expectations (Sampson & Shi, 2019). Other scholars argue that individual factors trump market pressures in explaining short-termism (Lavery, 1996; Marginson & McAuley, 2008). For one thing, there is a general tendency to hyperbolically discount the future—that is, to value the future less than the present in an economically irrational way (Frederick et al., 2002). For another, individuals have different temporal orientations and depths: Some people are more disposed to think about the future than the past, and some of those people are more inclined to

think about the distant future (Bluedorn, 2002; Bluedorn & Waller, 2006; Shipp et al., 2009; Zimbardo & Boyd, 1999). Such individual differences can have strategic effects: Managers who are naturally inclined to focus on the near term have shorter planning horizons (Das, 1987) and a diminished ability to anticipate the future (Lavery, 1996; Marginson & McAuley, 2008).

Although these diagnoses differ, the proposed remedies share a common goal: enable the firm to devote more resources to the long term. Thus, one could ameliorate market pressures by, say, eliminating the demand for quarterly earnings guidance (Barton, Manyika, & Williamson, 2017). One could hire people who naturally think more about the long term (Marginson & McAuley, 2008). Or, per calls for temporal ambidexterity, wherein one creates different “time zones” within the same firm, some focusing on the present and some on the future (Ancona et al., 2001), one could set aside special units that “truly are free to ‘think about the future’” (Lavery, 2004, p. 959). In short, to the extent that there is an answer to the question “How do firms think about the long term?” the answer has been: “They don’t really, so they should do more of it.”

This proposition makes intuitive sense: Attention to the future would seem to be a prerequisite for appropriately valuing the long term. But, while attention may be necessary, it is insufficient. Implicit in these remedies—implicit in the idea that firms would more accurately value trade-offs between the long and short terms if only they could escape the noise of the present—is the belief that it is possible to see the future clearly. After all, it is possible to think about the future, but think about it poorly. The suggested fixes for short-termism equate long-termism with prediction, which is to say they conflate the act of *thinking* about the future with the act of *knowing* the future.¹ But if it were possible to predict the long-term future, the chief

¹ Some work on short-termism attempts to avoid this trap by drawing a distinction between “short-termism” (defined as the tendency to make decisions that privilege the near future over the far future) and “myopia” (defined as the inability to perceive the future), but they nevertheless counsel more attention to the future, as though a nearsighted person could see a faraway object any more clearly if they stared at it for a longer time.

question facing the firm would not be how to make strategy under uncertainty because there would be no uncertainty. Instead, the challenge (to the extent there was one) would be one of execution (Knight, 1921, p. 268). Firms would simply be vehicles for solving optimization problems—for finding the “one best way” (Taylor, 1911).

Not so long ago, this was in fact the goal. Amid the relative stability of the postwar years, firms developed elaborate planning systems based on the notion of scientific management with its goal of optimizing firm behavior. Planning required predictability, and stability afforded that—or at least the possibility thereof. One purpose of the corporate structure known as the M-form was to do exactly what critics of short-termism call for today: to elevate executives above the nitty-gritty of day-to-day management so that they could focus on the long-term trajectory of the firm (Chandler, 1962; Freedman, 2013). However, as environmental turbulence expanded in the 1970s (Grant, 2003), the limits of prediction became more salient and the process of planning more fraught. As Mintzberg (1994) noted, the planning school of strategy, which sought to position the firm for the long term through elaborate plans, suffered from the “fallacy of prediction”—the notion that the world would “hold still while a plan is being developed and then stay on the predicted course while that plan is being implemented” (p. 110). In contrast with the planning school, Mintzberg advocated a learning approach, which emphasized incremental responses to short-term fluctuations in the environment (Brews & Hunt, 1999).

Absent the ability to predict the long run, a focus on the short run becomes an understandable way to cope with uncertainty. At the individual level, a focus on the long term can heighten role ambiguity—the difference between the information a person has and the information that person needs to complete a task—which in turn can degrade managerial effectiveness and thus firm strategy (Marginson & McAuley, 2008). Shortening the time horizon

increases the relative amount of information available, shrinking the gap between what one knows and what one needs to know in order to make a decision. At the organizational level, Cyert and March (1963) noted that firms “avoid the requirement that they correctly anticipate events in the distant future by using decision rules emphasizing short-run reactions to short-run feedback rather than anticipation of long-run uncertain events” (p. 167). Given the option, firms tend to concentrate on exploiting existing capabilities, engaging in sub-optimal levels of exploration (Uotila et al., 2009). That is, they often sacrifice the future for the present. As March (1991) wrote, exploitation dominates because its “returns are positive, proximate, and predictable,” whereas the wages of exploration are “uncertain, distant, and often negative” (p. 85).

If a focus on the (more predictable) short term is a mechanism for coping with the uncertainty of the long term, then attempting to cure short-termism by increasing the attention devoted to the long term is nonsensical, merely reinforcing the very problem it is designed to avoid. To the extent that the fundamental challenge facing the firm is formulating strategy under uncertainty, encouraging firms to focus on the long term begs the question. The necessary question is not (or not only) *how much* firms think about the future, but rather *how* they think about the future.

It is a question made all the more vexing by the need to simultaneously attend to the present. After all, the short term is not merely a refuge from uncertainty; it is the prerequisite for the long term. This challenge, too, is qualitative as well as quantitative. It is certainly true that organizations must appropriately balance the amount of exploration with the amount of exploitation. (Per March, 1991, “The basic problem confronting an organization is to engage in enough exploitation to ensure the organization’s current viability and to engage in enough

exploration to ensure future viability” [p. 105].) But the bigger problem is that these activities are thought to be *in contradiction*: Exploration and exploitation operate according to different logics, and therefore the need to do both creates paradox. Yes, one can create a structurally ambidextrous organization (Tushman & O’Reilly, 1996), differentiating exploration and exploitation so as to attend to both, but that which is differentiated must ultimately be reintegrated (Lawrence & Lorsch, 1967). This enduring need for integration highlights the shortcoming of structural ambidexterity: It does not actually resolve the ostensible paradox between exploration and exploitation. It merely shifts the locus of that paradox to the top management team. It is not apparent how, exactly, managers are supposed to tolerate paradox (Smith & Tushman, 2005). In addition to asking how firms think about the future, we must therefore also ask how they do so while still attending to the present.

Just as the management literature cites various potential causes of corporate short-termism, so the public policy literature suggests many factors that encourage government to focus on the proximate rather than the distal future. Not only do the same psychological factors, like the tendency to discount the future, apply, but there are also system-level pressures associated with democracy. Politicians are incentivized to focus on the costs and benefits of the current electoral cycle; the concerns of voters, who eschew short-term pain and insist on immediate results; and the demands of special-interest groups, whose short-term objectives can undercut efforts at more sustainable policy (MacKenzie, 2016). Practitioners also cite the tyranny of the in-box, the relentlessness of the news cycle, and the press of social media (Zegart, 2009). As Al Gore (2000) once wrote, “The future whispers while the present shouts” (p. 170).

If that is the case, then the answer to short-termism in government would seem to be to make the future “louder” in some fashion—to turn up the volume vis-à-vis the present. And that

is, by and large, the solution that advocates of greater long-termism offer. There are dozens of proposals to make the future more conspicuous in government affairs—to legally mandate that policymakers safeguard the interests of future generations; to strengthen the voting power of the young and weaken that of the old; to grant legislators more time in office and to require that they set long-term goals (Boston, 2014; Boston, 2016). There are even proposals to establish a “Secretary of the Future” or, internationally, a “UN High Commissioner for the Future.” But these proposals suffer from the same faulty assumption of recommendations to counter corporate short-termism: They confuse attention to the future with knowledge of the future. Again, it is possible to think about the future but do so poorly. Every policy is, in effect, a prediction, and the difficulty of prediction increases the further one travels from the present.

Policymakers thus eschew long-term decision-making for the same fundamental reason that corporate strategists do: It is a mechanism for coping with uncertainty. It therefore makes little sense to urge policymakers to spend more time pondering the (uncertain) long term if the reason they are avoiding it is uncertainty. In a precise parallel with March’s contrast between exploration and exploitation in firms, Boston (2016) writes:

Many policy problems ... exhibit a cost-benefit asymmetry: governmental action to address them requires the imposition of short-term costs, yet most of the benefits accrue later. Moreover, while the costs are often relatively direct, certain, visible, and tangible, the benefits are less direct, more uncertain, less visible, and perhaps intangible. (p. 87)

Given the difficulty of predicting the long-term future, we thus find ourselves back at the original question: How to formulate strategy under uncertainty?

METHODS

I investigated the U.S. Coast Guard's strategic foresight effort to examine how organizations formulate strategy under the uncertainty of the long-term future because case studies are well-suited to answering "how" and "why" questions (Eisenhardt, 1989; Yin, 2003). I employed a longitudinal single-context design because the Coast Guard's strategic foresight activity presents a seemingly unique context that is best studied over the course of its 22-year history. Among other things, this approach allowed me to address multiple units of analysis, focusing on the strategic foresight effort while also investigating its impact on individuals, programs, and the organization as a whole. Given this design, I combined data collection methods—using semi-structured interviews and archival research—in an approach that was in part historical (Jones & Khanna, 2006; Ventresca & Mohr, 2002).

Research Context

The U.S. Coast Guard is a maritime military, regulatory, intelligence, and law-enforcement organization that has 11 statutorily mandated missions, ranging from marine safety to fisheries protection to coastal security to war-fighting. As such, it maintains a rapid operational tempo—Coast Guard personnel note that, unlike the other military services, they are always fully deployed—and the federal government often calls upon it to address maritime emergencies, such as Hurricane Katrina and the Deepwater Horizon oil spill. The Coast Guard has some 50,000 full-time employees (42,000 active-duty military and 8,000 civilians), and its budget is roughly \$12 billion, making it (by far) the country's smallest military service. It is led

by a four-star admiral who serves as commandant, but unlike other branches of the military, the Coast Guard is part of the Department of Homeland Security.²

The Coast Guard presents an interesting context for a qualitative inductive study of strategic foresight for two reasons. First, Project Evergreen is considered something of a “gold standard” within the U.S. government because it has been operating longer than any comparable effort, it has had demonstrated and documented successes, and agencies such as the Federal Emergency Management Agency (2012) have tried to emulate it. Second, as mentioned earlier and as detailed in “Findings,” the Coast Guard is an unlikely organization to have a foresight effort because its operational culture has traditionally kept it focused almost exclusively on the short term. What’s more, although Project Long View began in 1998, Project Evergreen began in 2003—i.e., at a time when the Coast Guard’s operational responsibilities were increasing markedly because of the U.S. response to the September 11 attacks. The Coast Guard therefore represents an extreme case that can yield theoretical insight into how organizations formulate strategy under the uncertainty of the long-term future.

Data Sources and Analysis

I collected comprehensive interview and archival data on the initiation of Project Long View in 1998, its rebirth as Project Evergreen in 2003, and its evolution in the years since. Beginning with a key informant with whom I had many informal conversations, I proceeded via snowball sampling (Miles & Huberman, 1994), while recognizing the limitations of that technique, ultimately conducting 23 interviews with 20 informants, most of whom were current or former senior Coast Guard personnel. All interviews were semi-structured, and most lasted approximately one hour, yielding some 600 transcribed pages of data.

² In wartime, the president may shift operational command to the Navy, a component of the Department of Defense.

I began by interviewing the former Coast Guard officials and consultants responsible for initiating Projects Long View and Evergreen, including Admiral James Loy (ret.) and Admiral Thad Allen (ret.), both of whom served as commandant. Early interviews focused on developing a history of the Coast Guard's scenario-planning program as well as developing an understanding of how the process worked and changed over time. Drawing on these interviews, and triangulating (Jick, 1979) with archival Coast Guard sources, I constructed a "strategic narrative" (Stryker, 1996) of the Coast Guard's scenario-planning efforts, which I used to guide future interviews.

After conducting the first 10 interviews, I paused data collection, reviewed transcripts, wrote summary sheets of each interview, and coded each interview using QSR NVivo, staying close to the data. From this coding, I developed the proposition that strategic foresight served as a dynamic capability (Teece et al., 1997) that enabled the organization to formulate strategy under the uncertainty of the long-term future. This proposition gave me "a story about why acts, events, structures, and thoughts occur" (Sutton & Staw, 1995, p. 378)—specifically, that scenario planning had helped the Coast Guard to adapt to the post-9/11 environment by reconfiguring its asset base—and it enabled me to identify "dynamic capability" as a construct (Eisenhardt, 1989) that I could use to focus further data collection.

Then, iterating between theory and data, I conducted a second set of 10 semi-structured interviews, asking questions focused more narrowly on whether and how Projects Long View and Evergreen had contributed to the Coast Guard's ability to sense change, seize strategic opportunities, and reconfigure the organization in the face of change—that is, whether the Coast Guard's strategic foresight efforts aligned with the "microfoundations" of dynamic capabilities (Teece, 2007). I stopped data collection after 20 interviews, when I felt the marginal value of

information was low. Then, taking the microfoundations of dynamic capabilities as a specified theoretical construct, I recoded the first set of 10 interviews, and I coded the second.

At this point, it became clear that my emerging theory of strategic foresight as dynamic capability was not expansive enough to account for how the Coast Guard had developed strategy for the long-term future while maintaining or even improving operations in the present. In fact, in many ways, it seemed that the Coast Guard's strategic foresight capability contradicted core features of a dynamic capability, despite superficial similarities.

In its place, I developed a new proposition that the scenario-planning exercises had enabled the Coast Guard to simultaneously pursue exploration and exploitation by altering participants' mental models of time, such that the future and present were seen as complementary rather than competing. I therefore recoded the entire data set, looking more closely at mental models and changing notions of time. I also conducted three follow-up interviews to clarify points that specific informants had made about time and the effects of Long View and Evergreen, and I e-mailed follow-up questions to another 10 informants seeking clarification and expansion of their comments on the same.

Throughout this process, I triangulated data (Jick, 1979) gleaned from the interviews by consulting the documentary record of Long View and Evergreen, specifically the reports that each iteration of the scenario-planning exercise produced. I also traced the impact that those exercises had on Coast Guard strategy by reviewing strategy documents issued by the Coast Guard since Long View began in 1998. Where informants suggested that Long View or Evergreen had impacted a particular decision or program, I consulted congressional testimony, U.S. government reports, practitioner articles, and popular press accounts in order to better understand whether and how Long View and Evergreen had affected that decision or program.

FINDINGS

This study has eight principal findings that build on each other:

1. The Coast Guard had traditionally focused almost exclusively on the present—an emphasis that left it without the capacity to formulate strategy for the long-term future.
2. Long View and Evergreen provided a mechanism for formulating strategy under the uncertainty of the long term—that is, a structure for *how* to think about the future.
3. Long View and Evergreen generated more attention to the long term, not only via the scenario-planning exercises themselves but through ripple effects they had at the individual, program, and organizational levels. Which is to say that by solving the question of *how* to think about the future, Evergreen and Long View solved the problem of *how much* (or how little) the organization thought about the future.
4. Increased attention to the future (exploration) should have resulted in decreased attention to the present (exploitation), but Long View and Evergreen actually enabled action in the present even as they augmented thinking about the future.
5. Long View and Evergreen accomplished this by changing the mental models of participants such that they began to see time as “loopy” rather than linear, cultivating a cognitive ambidexterity that allowed them—and, through them, the organization—to perceive the present and the future as complementary rather than competing.
6. Evergreen demonstrated that time is a system, enabling what I call “triple-loop learning” or “learning from the future.”
7. By enabling ambidexterity, Long View and Evergreen helped the Coast Guard adapt more rapidly to surprise, most notably to the September 11 terrorist attacks.

8. Despite similarities between the constructs, I find that strategic foresight is not a dynamic capability, and I introduce the notion of “scrappy foresight” in its stead.

In this section, I explore each of these findings in greater detail.

The Coast Guard Had Been Short-Term

Operational mandates, cultural forces, and budgetary pressures have traditionally conspired to focus the Coast Guard almost exclusively on the short term, with the result that it lacked the capacity to formulate strategy for the long-term future.

Both inside and outside headquarters, the Coast Guard’s highly operational mission set—which ranges from search-and-rescue to environmental protection to port security—keeps many service members focused on the day-to-day. As one retired vice admiral put it:

The real challenge with an operating agency like the Coast Guard [is] it’s an agency that has to do something every single day. We used to always say the Coast Guard is fully deployed. There’s no garrison force that’s just waiting to go do stuff. It’s fully deployed all the time.

This high operational tempo is punctuated by the need to respond to periodic maritime crises, such as hurricanes and oil spills, that require considerable resources and reinforce attention to the present. As a retired senior Coast Guard leader noted:

You’re working along, chugging away on something, and then an entirely different tasking comes in, driven by something that happened somewhere, and then what you were doing gets interrupted for however long. Deepwater Horizon is a good example. That was an all-hands-on-deck evolution that went for months.³

These responsibilities have cultivated a culture that proudly emphasizes what several informants called a “bias for action”—for doing rather than thinking or strategizing. As one retired captain put it, “We come from a response orientation. That’s in our blood. Our whole idea

³ The Deepwater Horizon oil-drilling platform exploded in 2010, generating the largest oil spill ever in U.S. waters. As the federal government’s on-scene coordinator, the Coast Guard was responsible for overseeing all containment and clean-up efforts.

is: when the alarm goes off, to be able to fly into action. We're very comfortable in that reaction mode." Or, as another former Coast Guard officer told me:

The Coast Guard is inherently a reactive organization. ... We get a hurricane, it floods people, it rips stuff up. We go in there, we swoop in, we look great, and then the Congress showers us with money, right? This is what we do. This is our bread and butter. This is the organization.

Said another: "The Coast Guard typically has a very action-oriented ethos. It's very much about doing stuff: rescuing people, putting out fires, saving people, interdicting drugs, doing fisheries. It's very task-oriented."

That mindset naturally shortened the time horizon of the organization and its members.

One retired Coast Guard officer said:

We have a very operationally focused culture. Everybody loves to do operations. We can deal with the here-and-now and conquer whatever the threat is. It's really hard for people who have this bias for action and dealing with current operations to step back and find the time and discipline to focus on the future.

Another agreed:

We pin medals on aircraft commanders and people that are doing rescues at sea because something emergent happens, and they solve it quickly, successfully and save lives. Everybody in the Coast Guard, if you're involved in that, your time frame looking forward is the next day or two, or if it's a bad oil spill, maybe a few months or something.

One of the consultants who worked on Long View and Evergreen said: "Those organizations that do pride themselves on a high degree of operational excellence—like Coast Guard, the Marine Corps—it's not typically in their core DNA to do the big thinking about the future."

To the extent that Coast Guard leaders might have wanted to break this pattern, they were hampered by the constraints facing any federal agency, not least the congressional budget cycle, whose annual demands fed what Admiral Thad Allen (ret.), who served as commandant from 2006 to 2010, called the "tyranny of the present." He noted:

There's almost a rhythm this town operates on. It sucks all the energy out of the room, and you spend a lot of time just perpetuating the process. You spend so much doing that you don't look down the road and above the dashboard and see where the hell you're going.

He drew a vivid analogy: "Have you ever seen one of those machines that gobbles up the asphalt before they repave? ... This town eats up budget years like those machines eat asphalt. And that's how we measure success. We eat up budget years." One retired Coast Guard executive said that this environment engendered a certain fatalism whenever someone even raised the idea of a more strategic approach: "For us it was all, 'Whatever. We plan when we get next year's budget markup.' That was long-range planning."

The demands of the budget cycle were felt vividly not only by the service's top leaders but by the headquarters staff generally—i.e., the component of the service that is more removed from present-focused field operations and therefore, in theory, should be able to consider the future. A former captain explained why that is not the case:

A day at Coast Guard headquarters is a day with your hair on fire because some congressman or some staffer of some senator calls up and wants to know why you didn't spend more money on fisheries in Alaska and the OMB [Office of Management and Budget] calling about how they need to cut X number of million dollars out of some part of your program. You multiply that by a hundred things every week, and it causes a lot of the intellectual capacity of the Coast Guard headquarters to be focused on the very near term.

So it was that, for decades, a combination of operational responsibilities, a cultural proclivity for action, and the demands of Washington kept the Coast Guard focused on the present and eroded whatever capability the service might have had for long-term strategizing.

How to Think About the Future

When Admiral James Loy became commandant in 1998, he wanted to reorient the service toward the longer-term future—to break the tyranny of the present and instill a more

strategic mindset. However, he faced significant challenges. Removing the most conspicuous drivers of the service's short-termism, such as its legally mandated missions, was not an option. Even if it had been an option, many informants noted that it would have made little difference. Recall that short-termism is, at root, a mechanism (however dysfunctional) for managing the uncertainty of the long-term future, so Coast Guard personnel needed to be shown *how* to engage the uncertainty of the future. As a retired commander who worked on Evergreen explained:

[The short term] is our comfortable anchor spot that we will go back to. So, even if we eliminate those drivers, we are still, as people, hardwired to look at just the next week, next hour ... and so we have to overcome that and create a mechanism where they can actually think long-term.

The purpose of Project Long View was to provide that mechanism.⁴ Scenario-planning exercises use imagined futures as a way of bounding uncertainty, challenging assumptions, and developing strategy that renders an organization more resilient in the face of surprise. Loy embraced scenario planning as an essential component of strategizing, though he framed its purpose somewhat more colorfully:

Can you articulate half a dozen or a dozen scenarios that are part and parcel of your daily toil and your immediate and long-term future? Can you articulate those to the degree that you can ... define things that you ought to be doing and resources you ought to be attempting to procure ... [so that] when the defecation is in the blades [i.e., when the shit hits the fan] ... you will have at your disposal that what you need to effectively and efficiently do the work that's being asked of you?

To facilitate Long View, the Coast Guard's Office of Strategic Analysis,⁵ which reported directly to Loy, enlisted the Futures Group, a consultancy specializing in scenario planning.⁶

⁴ Project Long View was named after *The Art of the Long View* by Peter Schwartz (1991), a scenario planner for Royal Dutch/Shell. Shell had pioneered the use of scenarios in business after one of its executives attended a workshop at the Hudson Institute, which was founded by Herman Kahn—one of the subjects of this dissertation's first essay.

⁵ The name of this office has changed several times. It is currently the Office of Emerging Policy (DCO-X).

⁶ After being briefly acquired by Deloitte, The Futures Group was reconstituted in 2002 as The Futures Strategy Group, which continues to operate today.

Together, they began by identifying four variables that would have a significant impact on the service's future: the role of the federal government, the strength of U.S. economic vitality, the seriousness of threats to U.S. society, and the demand for maritime services. Combining the extreme value of those four dimensions and jumping forward some 20 years yielded 16 possible far-future "worlds" in which the Coast Guard might have to operate. Of them, Coast Guard leaders selected the five that they felt were most distinctive from each other while still being plausible—i.e., that best represented the range of futures the service might face. The Futures Group then wrote detailed scenarios describing those futures and the (fictional) events that had led to them. Each future world was given a name intended to capture its essence. For example, "Taking on Water" described a future in which the American economy struggled amid significant threats from environmental degradation.

Using those scenarios, the Coast Guard convened a 3-day workshop facilitated by the Futures Group. Teams of civilians and officers were assigned to different future worlds and charged with devising strategies that would enable the Coast Guard to operate effectively in those worlds. At the end of the workshop, the teams compared strategies. Those that came up again and again—i.e., across different teams—were deemed "robust" and formed the basis for Long View's final report (USCG, 1999a). That report identified 10 strategies—ranging from the creation of a more unified command structure to the development of a more flexible human resources system to the outsourcing of non-core functions—that would help the Coast Guard carry out its mission "no matter how the future unfolds" (USCG, 1999a, p. 3).

Loy embraced Long View's agenda, incorporating it into the Coast Guard's Strategic Plan (USCG, 1999b), but the Coast Guard did not actually pursue most of the strategies until after the September 11 attacks, when it conducted a retrospective study of Long View. The so-

called “Long View Review” found that, had the service implemented those 10 strategic initiatives more rapidly, it would have been better positioned to respond to the attacks—and the subsequent expansion of its mission. Long View had not anticipated the September 11 attacks specifically, but several of the scenarios had detailed significant terrorist threats to the U.S. homeland (e.g., in the “Balkanized America” scenario, “Terrorism strikes with frightening frequency, and increasingly close to home” [USCG, 1999a]). And the prescience of its strategies prompted Thad Allen, then the Coast Guard’s chief of staff, to advocate the creation of Project Evergreen in the fall of 2003.

Like Long View, Evergreen was a tool for crafting long-term strategy, but Coast Guard leaders also envisioned it as a way to instill “strategic intent” throughout the service—that is, to ensure that short-term decisions were made with long-term goals in mind.⁷ As with Long View, the Office of Strategic Analysis managed Evergreen and, once again, it enlisted the Futures Strategy Group (as the Futures Group was now known), as well as a small core team of Coast Guard personnel who worked part-time on the project. The process played out much as it had with Long View, with the consideration of four fundamental drivers of the Coast Guard’s future: the rate of globalization, the public perception of threat to security and quality of life, the U.S. conception of sovereignty, and the strength of the U.S. economy. This process yielded 16 possible worlds, of which the Coast Guard selected five for which the Futures Strategy Group drafted detailed scenarios.

At that point, the Coast Guard held a 4-day workshop off-site in which 56 Coast Guard service members and civilians were divided into five teams, each led by a high-ranking officer or

⁷ The final report of Evergreen I says: “Strategic intent consists of: Adopting a *systems view*; Focusing on *intent*; Thinking *across time*; Creating and testing *hypotheses*; Being intelligently *opportunistic*” (USCG, 2005, p. 26). I explore these goals more fully in subsequent sections.

civilian executive. For most of the 4 days, the teams were isolated from each other, with knowledge only of their world, asking a common question: Given the current state of the Coast Guard, what should it be doing to prepare itself given the imagined future? On the final day of the workshop, the teams convened to discuss their respective strategies, ultimately yielding 16 core strategies that would be useful across a range of futures. Coast Guard leaders subsequently refined this set, producing 11 core strategies that would enable the service to better understand and shape the maritime environment and to “act with strategic intent in a complex and uncertain environment” (USCG, 2005, p. 24).

This effort was the first step in institutionalizing Evergreen as a repeated process of sensing, envisioning, workshopping, and strategizing—a continuous “cycle of strategic renewal” (USCG, 2005, p. 25) (hence the name “Evergreen”). The first Evergreen report was published in May 2005 (USCG, 2005), and the process repeated every four years thereafter (roughly coincident with the commandant’s term of office). The U.S. Coast Guard (2009b, 2013a) released the report of what became known as Evergreen II in 2009, and it released the report of Evergreen III in 2013. Although the process and the output evolved somewhat with each iteration, Long View, Evergreen I, Evergreen II, and Evergreen III operated in roughly similar fashion: The Office of Strategic Analysis worked with a core team and the Futures Strategy Group to generate scenarios and hold workshops based on those far-future worlds that yielded strategies intended to “future-proof” the organization. Because of personnel changes, reduced leadership support, and a failed switch in consultants, Evergreen IV (USCG, 2015b) deviated from this pattern, but today Evergreen V is underway, albeit with a new contractor and a somewhat revised format.

By generating plausible far-future scenarios derived from germane trends in the present and by designing a carefully facilitated conversation around the implications of those scenarios, Long View and Evergreen showed Coast Guard personnel “how” to think about the future. As a former vice admiral said: “The whole idea behind Evergreen was to have some sort of structured way to address these difficult-to-get-your-hands-around uncertainties in the future.” Informants repeatedly stressed the utility of the architecture that the scenario-planning program provided, saying that it offered a “framework” for thinking about the future, a “tool” to think strategically, a “process” for envisioning the long term, and an “intellectual arsenal” for combating the tyranny of the present. As a civilian employee of the Coast Guard put it: “It was a very different way of looking at the future than even our people who did, from time to time, try to look at the future had ever experienced. There was some structure to it.”

In that sense, Long View and Evergreen provided one concrete, if narrow, answer to the question of how to formulate strategy under the uncertainty of the long-term future: Hold a scenario-planning exercise, consider multiple futures, and ask what strategy would make sense in any of them. Less literally and more broadly, Long View and Evergreen stressed that the way to cope with uncertainty was to accept and address it rather than to avoid it by focusing on the short term. One retired captain who worked on Evergreen described the process as a sort of exposure therapy, whereby immersion in imagined scenarios stretched participants’ notion of what was possible such that “they aren’t afraid of the volatile nature of the future, of the uncertainty that we face.” By defanging uncertainty, Long View and Evergreen opened the Coast Guard’s aperture such that it could attend to the future, not just the present.

How Much to Think About the Future

By providing a structure for *how* to think about the future, Long View and Evergreen

addressed the problem of *how much* the Coast Guard attended to the future.

Most obviously, the organization spent more time on the long term simply by virtue of holding the exercise. All participants in the process—from the Office of Strategic Analysis staff, to the core team members, to the workshop attendees, to the Coast Guard leadership—were exposed to and participated in consideration of possible futures. Over the course of the program’s 22-year history, over 1,000 members of the organization have been explicitly involved in the formulation of strategy for the long term in a way that has accounted for future uncertainty. Repeated exercises dedicated to the consideration of the long-term future by definition increased the attention the Coast Guard gave to the long-term future and, as many informants pointed out, suggested that the organization was according greater value to the long term.

Long View and Evergreen also had a multiplier effect within the organization in several ways.

First, Long View and Evergreen served as an intellectual accelerant at the organizational level, fueling the development of Coast Guard strategy. The Long View strategies directly fed into the Coast Guard’s 1999 Strategic Plan, the first it had produced in its 200-year history. The Long View and Evergreen process also informed the Commandant’s Intent Action Orders (CIAOs) that Thad Allen issued when he took command of the Coast Guard in 2006 (USCG, 2008, pp. 8–9). The 10 CIAOs outlined Allen’s plans to reorganize the service, and CIAO #6 specifically cited Evergreen’s role in the strategic transformation of the Coast Guard (as cited in Government Accountability Office [GAO], 2009, pp. 15–16). The service’s 2007 *Strategy for Maritime Safety, Security, and Stewardship* was “built on the foundation of the Coast Guard’s Evergreen strategic planning process and its guiding principles” (USCG, 2007, p. i). Evergreen

also informed a tranche of topic-specific strategies, from an Arctic strategy (USCG, 2013b) to a Western Hemisphere strategy (USCG, 2014) to a cyber strategy (USCG, 2015a). As the officer who headed the Office of Strategic Analysis at that time said: “For me, the work of Evergreen—and Long View before that—directly played into our ability to ultimately get to the point when the Coast Guard issued enterprise-level strategies.” Most recently, the U.S. Coast Guard’s 2018 Strategic Plan, issued shortly after Admiral Karl Schultz became commandant, explicitly highlights Evergreen as a “long-term strategic planning effort” that informs management of the service (pp. 7–8).

Second, Evergreen directly informed efforts at the program level, as participants returned to the field and either repurposed Evergreen scenarios to address problems they faced or even replicated its process—a point I will address more thoroughly in the next section. Even when participants did not explicitly use Evergreen’s process or outcomes, they often reported that the exercise shifted the amount that they attended to the future and the way in which they thought about the future. One rear admiral said:

It just changed my whole way that I would attack any problem. I’m very mindful of any decisions that you make—it’s easy to make them with a short-term mindset, but that doesn’t always get you where you need to be in the long term.

A command master chief petty officer said that the process “provided me many more opportunities to continue to look forward” and then recounted a recent conversation with a colleague:

He and I were here in my office here this morning talking about, 25 years from now, what is the Coast Guard Reserve component going to look like? He’s an Evergreen guy. ... I would never have been able to talk to him about 20, 25 years down the road because I just wouldn’t understand how to think that way had it not been for being part of a couple Evergreens.

Finally, participants who were in leadership positions transmitted their new long-term orientation to their subordinates in an attempt to gradually shift the organization toward the strategic and to prepare their charges for a Coast Guard that was not single-mindedly operational. One retired captain epitomized the shift toward the future that many Evergreen participants experienced. A former helicopter pilot and self-described “pointy-end-of-the-spear operator” who initially doubted the value of working on Evergreen—“[I] couldn’t do back-to-back commands, so I was stuck at staff assignments for 1 year, 9 months, and 20 days”—found the exercise so useful that he inculcated its lessons in his subordinates, who then rose through the ranks, accelerating the organization’s shift toward the future:

My opportunity when I got back to the field was to make sure that my wardroom⁸—my officers and the commanding officers that worked for me—were starting to think that way. I made them all read Evergreen. ... I was trying to make that next generation of guys who worked for me think strategically, and I think it was perhaps successful because my senior officers all went on to commands. ... I think that strategic thinking has [now] become part of the Coast Guard ethos at the leadership level.

In sum, by giving Coast Guard personnel a tool for *how* to think about and formulate strategy under the uncertainty of the long-term future, Long View and Evergreen increased *how much* they thought about the future. Even amid persistent drivers of short-termism—from an entrenched culture of responsiveness, to a plethora of operational demands, to the relentless rhythm of the congressional budget cycle—the Coast Guard generated a newfound attention to the long term. This constituted a significant break with the past—it was an “inflection point,” as one former Coast Guard executive put it.

⁸ A wardroom is the commissioned officers’ mess, or dining area, aboard a warship.

How to Think About the Future While Acting in the Present

Although they denoted an inflection point, Long View and Evergreen did not constitute a wholesale organizational shift from the operational to the strategic, the present to the future. But that was never the point. The consideration of potential futures and the associated strategy development were intended to augment rather than supplant or detract from the Coast Guard's operational capabilities.⁹ Put differently, the goal of Long View and Evergreen was not simply to get Coast Guard personnel to think more about the future. The goal was to get them thinking about the future in a way that informed and improved their ability to operate in the present. Allen put the matter bluntly:

The question is, can you walk and chew gum at the same time? Can you multitask to deal with the tyranny of the present, and then try and understand the implications of the future and the risk associated with the future and how you minimize the risk of what might happen in the future while you're managing the tyranny of the present. You have to do both, and if you don't do both, you're going to fail.

This is precisely the point made in the literature on exploitation and exploration: Organizations must attend to both the present and the future if they are to survive and thrive over time. But that literature also sees exploration and exploitation as being in tension—i.e., there is a trade-off between the present and the future. What is interesting about the Evergreen-fueled shift toward the long term is that it did not reduce attention to the near term. If anything, the opposite occurred: The Coast Guard's future-thinking seems to have augmented present-doing. Exploration did more than benignly coexist alongside exploitation; it actively enabled it.

This phenomenon occurred at multiple levels, but it is most visible—the causal relationship clearest—at the individual level. (I will address the organizational level in a later

⁹ “The purpose of Evergreen is to provide the Coast Guard with the essential tools, knowledge and insights to act effectively despite much greater uncertainty about the future. The process is not designed to supersede or diminish the tradition of rapid response and tactical flexibility that has been [a] hallmark of the Coast Guard. Rather, its purpose is to complement and build on that proud legacy” (USCG, 2005, p. 1).

section.) As Evergreen participants returned to the field, resuming their operational responsibilities, they layered their newfound future-oriented strategic sensibility onto the challenges they faced. One retired vice admiral said: “Smart people that came back from the Evergreen experience and then were embedded back in programs would say, ‘Hey, I think there’s some real good that came out of that that we can take advantage of.’”

One retired senior Coast Guard leader said: “I would have to credit some of what was done with the Evergreen process to the forward thinking I was able to do in getting the Coast Guard ready for whatever threats we’d have to confront out in the Pacific region.” This officer cited specific initiatives, noting that they were a function of Evergreen’s “overarching framework,” specifically its recommendation to cultivate partnerships and increase situational awareness in the maritime domain (USCG, 2005, p. 24):

We forged bilateral relationships with six key Pacific Island countries to expand information sharing, conduct professional exchanges to enhance their nascent capabilities, hold regular joint exercises and operational patrols. We developed novel ship rider agreements that authorized CG [Coast Guard] cutters¹⁰ to embark [using] other nations’ maritime authorities, thereby enabling CG patrols through their EEZs [exclusive economic zones]¹¹ to intercept illegal fishers. ...

To enhance MDA [maritime domain awareness], we routinely shared information with the countries aligned through the North Pacific CG Forum (coast guards of China, Russia, Canada, South Korea, Japan, and U.S.). As this alliance grew more robust, we coordinated patrol activities, held joint training exercises, shared sighting information (especially to track fishing activity), and tackled issues with formally designated working groups. ...

Other domestic partnerships that we took to new levels of interoperability, openness, and information sharing included NOAA [National Oceanic and Atmospheric

¹⁰ “Cutter” is the term the Coast Guard uses to refer to the ships in its fleet that are over 65 feet long. Its use of the term can be traced to its founding as the Revenue Cutter Service in 1790, after Alexander Hamilton proposed—and Congress approved—the construction of 10 ships (“cutters”) to enforce a system of tariffs and duties designed to boost the young nation’s economy by discouraging British imports. Today, the service still proudly cites the “Letter of Instruction” that Hamilton sent to the captains of those cutters on June 4, 1791, exhorting all personnel to study it (USCG, 2002, p. 69) and including the full text in its chief doctrinal publication (USCG, 2009a, 2014).

¹¹ The United Nations Convention on the Law of the Sea (1982) established the concept of exclusive economic zones, granting countries control of marine resources within 200 nautical miles of their coast.

Administration], National Marine Fisheries Service, DOD [Department of Defense], FBI [Federal Bureau of Investigation], NSA [National Security Agency], State [Department], and local entities. ... Evergreen specifically called for enhanced partnerships, thus validating the significant effort that I dedicated to establishing and expanding external relationships.

This officer concluded: “Evergreen facilitated my ability to prioritize effort through strategic intent as adapted to the uniqueness of the western Pacific. ... I would not have dedicated such energy to outreach and relationship-building without the benefit of the Evergreen initiative.”

Other Coast Guard officers took the Evergreen process and repurposed it to address their own strategic issues. One rear admiral who first participated in Evergreen as a junior officer explained that she ran a scenario exercise to explore how the range of possible futures the Coast Guard might face in the Great Lakes should inform the capabilities it should pursue now:

I love this idea [of scenario planning using alternative futures], and I’ve used it along the way in my own world of work wherever I’ve been. ... In my last job, I was in District 9. I was the D9 commander, so I was in charge of the operations around the Great Lakes and St. Lawrence Seaway. We had 10 cutters in D9. I got my senior leader group together and I said, “Here’s what I want to do. Let’s look out 20 or 30 years.” By then we knew some of our cutters were already old, but by then they’ll pretty much all be past their life expectancy. Let’s really do some work from a Great Lakes perspective of what are the capabilities we would need a future fleet to have. ... The document we came up with showed that ultimately we’d need about 9 [cutters]. We came up with really specific capabilities that each one would need.

She explained that Evergreen enabled her to avoid making procurement decisions simply by extrapolating from the present:

As you have to replace assets, if you haven’t really done some of that deeper long-term thinking, then what happens is your replacements look pretty much like what you had. ... If you have a bigger picture and you’re not constrained by any of that currently, it just makes it so much easier to come up with the right answers.

These officers each clearly saw the futures-thinking that they experienced through Long View and Evergreen as a tool that enabled them to better fulfill their operational responsibilities.

They experienced no tension or paradox between thinking and doing, between strategy and operations, or between the future and the present. Instead, they saw the future and the present as complementary, not competing. Exploration enabled exploitation.

How to Think About Time

From a theoretical perspective, the question is, how? According to the management literature, exploration and exploitation are not merely in tension with each other—they also reflect competing logics. Managers may try to achieve ambidexterity in a variety of ways, but ultimately they must reconcile what is, in essence, a paradox (Smith & Tushman, 2005). They must pull off the Fitzgerald-esque feat of functioning while holding two opposing ideas in their minds. One of the key findings of this study is that Long View and Evergreen enabled participants to do that by altering their mental models of time, instilling a *cognitive ambidexterity* that enabled them—and through them, the Coast Guard—to simultaneously explore and exploit.

Practitioners have long touted scenario planning as a way to challenge existing mental models (e.g., Wack, 1985a, 1985b). Yet the purpose is generally to test such assumptions in a way that changes *what* managers think an organization should do, as when Long View developed its 10 strategies for the Coast Guard. The process was intended to produce content. Following Long View, the Coast Guard's goal became more ambitious: It became to inculcate process at the individual level. As the report of Evergreen I put it:

The broader and perhaps far more important aim of the effort is to change *how* [emphasis added] people think—to develop strategic thinking as a matter of cultural habit in Coast Guard men and women ... [including] an ability to think not just by reference to the past, but with anticipation of what the future might bring. (USCG, 2005, p. 30)¹²

¹² It is important to note that, although this goal was explicitly stated in the Evergreen report, the project relied on the experience to convey the lesson implicitly. As one informant explained, a lecture on the epistemology and ontology of time would not have worked: “You can’t do it that way because it won’t work. It almost has to be a lived experience. It’s really OJT [on-the-job training].”

As the previous sections have shown, Evergreen succeeded in this aim: Coast Guard personnel changed how they thought about the future, how much they thought about the future, and how they used future thought to facilitate present action. Here, I argue that Evergreen accomplished even more: It changed how participants thought about time itself.

Humans tend to conceive of time as linear and unidirectional—as moving from past to present to future—with each time frame discrete: We remember yesterday; we experience today; and we anticipate tomorrow. This linear conception can accommodate differing views about epistemology (how much we can know about the future), ontology (whether the future is single and closed or plural and open), and agency (the extent to which we can control or even create the future). But prior to Long View, the Coast Guard’s approach to the future was largely deterministic—almost maximally linear. That is, it assumed that there was a single future over which it had relatively little control. To the extent that it engaged the long term, it extrapolated from the present and planned accordingly.

Scenario planning is based on radically different assumptions. Long View and Evergreen, for example, rested on the belief that, because the Coast Guard was operating in a highly uncertain environment, there were multiple possible futures and therefore prediction was futile (USCG, 2008, p. 4). Rather than plans that assumed linearity, the Coast Guard needed robust strategies that engendered flexibility in the face of discontinuity. As described earlier, Long View and Evergreen took trends in the present, jumped many years into the future to create plausible (not probable) worlds based on those drivers, worked backward to develop stories about how those worlds could come to pass, and then worked forward again to develop robust strategies. The cycle then repeated with each iteration of Evergreen in a sort of meta-cycle. This

conception of time is decidedly nonlinear, it is not unidirectional, and its time frames blur. In a word, it is loopy.

Long View and Evergreen transmitted this conception of time to those who came in contact with it, changing their mental models. Instead of perceiving time as linear, participants began to perceive it as loopy—a conception that provided the cognitive ambidexterity needed to manage the paradox posed by the need to both explore and exploit. If time is a loop, there is a fluidity among times rather than a tension between them—a continuous cycling of the experienced present and the imagined future. The notion that one must *either* think in the future *or* operate in the present is replaced by the notion that one may *both* think in the future *and* operate in the present. Loops resolve—or at least ameliorate—the paradox of exploration and exploitation by rendering competing time frames complementary. And, although mental models are an individual-level construct, managerial cognition—including managerial conceptions of time—affects organizational strategy.

To illustrate how this shift occurred, here I disaggregate the change in participants' mental models into two steps: (1) Long View and Evergreen convinced participants that the future is plural and therefore unpredictable, essentially opening participants to the possibility of nonlinearity; (2) Long View and Evergreen cultivated a loopy approach to time, in which imaginings of the future changed how and what participants attended to in the present, leading them to update their imaginings of the future.

The future is plural and unpredictable. Long View and Evergreen rested on their scenarios—the five detailed future worlds that formed the basis for strategizing—and through those scenarios they demonstrated that the future is unpredictable. After all, the imagined futures looked little like the present. Several informants noted that the unpredictability of the future was

a lesson the Coast Guard needed to learn. One retired captain said: “I think the problem the Coast Guard had pre-Evergreen was senior leadership tended to try and be predictive in what they wanted to plan for.” As an example, he cited the purchase of the HU-25 Falcon jet plane in the 1980s to replace some of the turboprop planes the service had traditionally used:

The big mission that got shoved down on the Coast Guard [at that time] was enforcing a 200-mile exclusive economic zone, primarily for fishing. We had a bunch of fixed-wing planes that were wearing out, so they decided we’ve got to replace those planes. They picked the plane that they thought was going to be the perfect thing for the 200-mile exclusive economic zone enforcement. They wanted something that could launch quickly, go very fast out, identify illegal activity, and get back home. So they basically bought a business jet. The HU-25 Falcon. It was great for that. But that didn’t end up being the long-term mission. They had tried to predict what the purpose of that plane was going to be. That isn’t really what it ended up doing.¹³

Thinking in terms of multiple possible futures better reflected the ontology of the future—if five future scenarios were plausible, then by definition there were multiple possible futures—and it was a more strategically sound approach than taking your best guess at a single future, because, he said, “Your prediction may be wrong.”

A retired command master chief agreed that the Coast Guard had tried to be too predictive in the past. He pointed to the Integrated Deepwater System Program (or “Deepwater”),¹⁴ an ambitious long-term effort that the Coast Guard initiated in the 1990s to recapitalize its entire fleet of planes and ships over 20 years. The problem was that Deepwater assumed that the Coast Guard’s missions would remain largely the same and therefore was ill-suited to the dramatic changes to those missions made in the wake of the September 11 attacks (Birkler et al., 2004). The chief explained: “I think what the scenarios did was highlight the

¹³ The Coast Guard used the Falcon largely for traditional Coast Guard missions that are better served by turboprop planes, which (among other things) have the ability to loiter on scene for longer times

¹⁴ This should not be confused with Deepwater Horizon.

uncertainty of what the organization might face.” And that meant the Coast Guard needed to become more flexible:

Deepwater was rebuilding the offshore capability. ... But then 9/11 happened, and you could make an argument where the focus was—and where it was for the next decade or so—was not 500 miles offshore. It was 5 miles offshore because of the threat that we perceived at that time that we could be attacked again. ... Yet, the world continued to change and the threats [continued to change]—the ice cap melts. We’ve got other responsibilities besides security in [the polar] regions. We’ve got fisheries responsibilities, search-and-rescue responsibilities, environmental responsibilities. It wasn’t that Deepwater was wrong, but it just showed ... that you need to be flexible. Based on the mission set the Coast Guard has, the maximum flexibility is what is required. That’s why we have multimission platforms versus single-mission platforms. Because we don’t know today.

Evergreen hammered home the idea that you cannot predict the future and that seeing the future as plural is strategically useful, because it leads the organization to prioritize flexibility, which in turn increases adaptability.

Time becomes a loop. By articulating detailed, plausible far-futures, Long View and Evergreen made participants attend differently to the present as they realized that developments might be “weak signals” indicating that a particular future was emerging.

To some extent this heightened attention was formalized: “In scenario-based strategy development, you have these milestones or waypoints where, if this happens, then we’re heading towards this scenario. If that happens, then we’re headed more towards this scenario,” a retired Coast Guard executive explained. And to some extent Evergreen managers tried to reinforce this idea by explicitly drawing links between the future worlds Evergreen considered and developments in the present. One said:

When we finished Evergreen and came up with the core strategies, I just continued to find examples of that particular scenario world that were manifesting itself. One of them was the increased climate changes. I would continue to put that out to the group that was in charge of that particular scenario, just as a way just to continue to keep it fresh in their minds that, “Hey, you know the stuff you worked on? You can see it, it’s happening, it’s

out there.” The idea to keep it relevant in their minds that what they were working on, again, to this idea, it’s not way out in the future. ... That was more of an informal way to keep it present in everybody’s mind that the future is happening one day at a time.

However, much of the attentional shift seems to have been spontaneous—and persistent.

One officer who worked on Evergreen III, which issued its report in 2013, noted in the fall of 2019 that his former colleagues remain sensitive to signs that a particular scenario is coming to pass: “[They] shoot me stuff all the time like, ‘See? This is what we talked about in “Treading Water” or “Quantum Leap” or whatever.’”

The imagined futures of Evergreen changed not only what participants attended to in the present—e.g., signs of climate change—but also how they did so. The future scenarios of Evergreen informed observations of the present, which participants immediately imbued with implications for the future. Their conceptions of time became bidirectional rather than unidirectional. One retired Coast Guard officer explained: “It changes the way you react to various news events or various things you see or how you search for information. ... You’re constantly thinking about what does this mean—how does this work in the future?” Another noted: “Anytime you spend a couple of days doing that scenario-based planning, it does cause you to look at the world differently, paying attention to other types of things. Think more about how things are changing and not just focus as much on the short term.” In other words, he paid attention to the present *in the context of the long term*. What’s more, observations of the present *updated* imaginings of the future, forming a feedback loop. “Putting it in nautical terms,” a retired vice admiral said, “you’ve got a destination in mind, and then you set an initial course to get there, but you might have to adjust that course along the way, and maybe you somewhat *adjust the destination* [emphasis added], too, as you learn more.”

Even when the present shouted—as it does in the midst of crisis—participants viewed the present in the context of the future. In fact, they projected multiple futures and then worked backward to inform what they should do in the present. One former officer gave this example:

When Deepwater Horizon happened, one of the things I did is I convinced the vice commandant to have a meeting with all the flags and SESs [i.e., admirals and civilian executives] at headquarters, which is probably 30 people, and talk about, well, what are the strategic implications of Deepwater Horizon for the Coast Guard? What might come down the pike because of this that we should be aware of and thinking about now? Legislative changes? Are there opportunities to get additional resources? Instead of waiting for congressional hearings and things to take place and just reacting to whatever we're told to do by Congress, what can we proactively reach out and do? Maybe if we weren't doing things like the Evergreen process, there wouldn't have been as much willingness to do that kind of thinking in the immediate aftermath of an ongoing incident.

In other words, an event in the present prompted Coast Guard leaders to consider new possible futures, which in turn led them to ask what actions they could take in the present to move toward the future they wanted. This was, in essence, a micro-level version of Evergreen's continuous 4-year cycle of sensing, envisioning, and strategizing that was taking place at the macro level. Evergreen was structured as a loop, its exercises rested on a loopy approach to time, and it transmitted that approach to participants, transforming their mental models.

Learning From the Future

In trying to change how Coast Guard personnel thought, Evergreen not only tried to inculcate an ability to think “with anticipation of what the future might bring,” it also sought to cultivate an “ability to think of problems in terms of systems, rather than just in mechanical or linear fashion” (USCG, 2005, p. 30). Evergreen did not explicitly connect these two ideas, but in conveying a loopy conception of time, it demonstrated that *time itself is a system*—a finding that we can use to create a model of “learning from the future.”

The field of system dynamics offers a way of modeling relationships in a nonlinear fashion, incorporating ideas like feedback loops and the interplay between cause and effect. It is, appropriately enough, where the idea of mental models originated, and its use shares many characteristics of scenario planning. As Forrester (1961) emphasized in *Industrial Dynamics*, system-dynamic models are not predictive. Rather, their purpose is to highlight their users' assumptions and to show how seemingly simple inputs can yield unexpected results, thereby challenging beliefs about how the world works. To Sterman (1991), such models are best thought of as “what if?” machines. They do not predict. Rather they offer “foresight” by enabling us to envision a range of (often surprising) possible futures that follow from our understandings of cause and effect. They create what Morecroft (1988) has called “microworlds”—intellectual playgrounds in which users can test ideas and the futures they generate. Scenario planning is intended to serve the same purpose, and Evergreen was, in effect, a “what if?” machine whose imagined futures provided Coast Guard personnel with “microworlds” in which they could safely test strategies.

To see how scenario planning enables us to consider time as a system, we can look at how system dynamics dovetails with certain conceptions of organizational learning (Senge, 1990). For example, we can view the notion of time as a system through the lens of Argyris's (1977) contrast between single-loop learning and double-loop learning, which incorporates the notions of both mental models and feedback loops. In single-loop learning, decision-makers begin with mental models (“priors” in Figure 1 below) from which they derive goals and actions to reach them—actions that they then alter as experiences (“outcomes”) demonstrate the need for course corrections. In double-loop learning, decision-makers use experiences not only to adjust their actions, but also to adjust their mental models and the goals that stem from them.

FIGURE 1

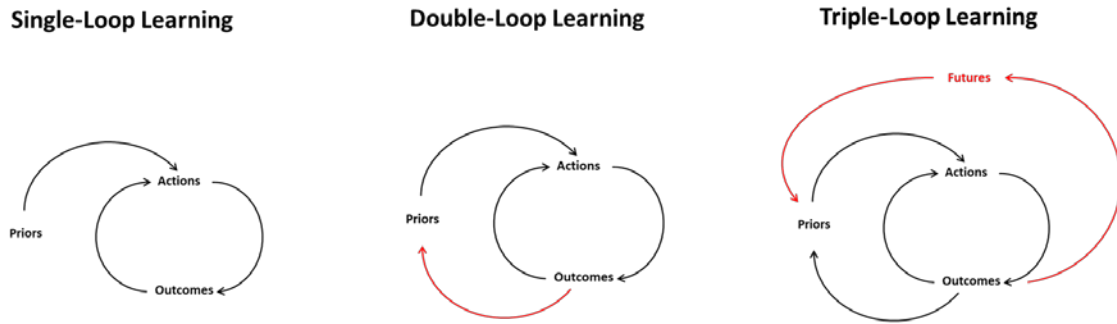


Figure 1: A model of “triple-loop learning” or “learning from the future” building on Argyris (1977).

Scenario planning can be thought of as adding a third loop to this conception of learning, in the sense that it enables decision-makers to use imagined futures—in addition to experiences—to adjust mental models. Indeed, as opposed to beginning with one’s mental models, from which one derives goals and courses of action, this model of “triple-loop learning” suggests that decision-makers could begin by using imagined futures to test and adjust their mental models before setting goals or taking actions (i.e., by starting at the top and moving counterclockwise). In this way, futures can inform priors, which then lead to actions that result in outcomes, which in turn affect the futures we can imagine, and so on. It is a model of “learning from the future.”

As an example, consider the Coast Guard’s approach to the Arctic via Long View and Evergreen. One of the Coast Guard’s statutory missions is “ice operations,” which includes providing year-round access to the polar regions using its fleet of three icebreakers. The mission has been largely scientific—for example, facilitating the resupply of McMurdo Station, a research facility in Antarctica—but as the ice caps have melted, the Coast Guard has faced new challenges, including increased activity as Arctic nations take advantage of easier access to

exploit resources within their exclusive economic zones.¹⁵ Multiple informants noted that Long View and Evergreen spurred the Coast Guard to recognize the impact that climate change might have on ice operations long before “it became the soup du jour,” as one said.

In 1999, one of the Long View scenarios—“Taking on Water”—envisioned a future of extreme weather events caused by global warming (USCG, 1999a), even though at that time, as one retired Coast Guard officer noted:

Nobody had any idea that the Arctic was going to lose the pack ice and that the Arctic cap was going to diminish to the extent it has. There was never an idea that you’d have cruise ships and fishing vessels and small sailboats and fish now migrating further north.¹⁶

That the Coast Guard began considering the possibility of a watery Arctic was a function of Long View and then Evergreen. “All of that is the benefit of the scenario planning,” the officer said. In other words, an imagining of the future prompted the Coast Guard to question its assumptions about its role in the Arctic.

With each successive cycle of scenario planning, Arctic issues became more salient as the Coast Guard updated its futures in light of its heightened perceptions of the present. One of the scenarios in Evergreen I—“Rising Tide”—considered a world in which, as a result of climate change, “The polar ice caps have continued to recede to the point where the arctic region is navigable fully half the year” (USCG, 2005, p. 11). Increased attention to the effects of climate change led to the reinforcement of the trend’s importance in Evergreen II, which made navigability of the polar regions a common theme of the scenarios and identified “Polar Mission

¹⁵ Eight nations border the Arctic: Canada, Denmark, Finland, Iceland, Norway, Sweden, Russia, and the United States.

¹⁶ Admittedly, there was international action to address climate change before 1999. Most notably, the United Nations Framework Convention on Climate Change was concluded in 1992 and took effect in 1994. The Kyoto Protocol, which set targets for the reduction of greenhouse gas emissions, was concluded in 1997 and entered into force in 2005, though the United States never ratified the agreement. The United States helped negotiate and became a signatory to the 2015 Paris agreement, but President Donald Trump withdrew from the accord in November 2019.

Capacity” as a core strategy: “Develop policy and expand capacity to project U.S. sovereign maritime presence in the Arctic and to protect and advance U.S. interests in the Polar Regions” (USCG, 2008, p. 24). Evergreen III reaffirmed the ability to operate in a warmed world as a robust strategic need: “The Coast Guard needs to reduce its vulnerability to changes in climate conditions, extreme weather, and retreating or changing coastlines” (USCG, 2013a, p. 36).

To be sure, by 2013, the threat from climate change was apparent, and one could argue that the Coast Guard was simply responding to obvious cues—that Evergreen provided little marginal insight. At the same time, global warming was a politically sensitive topic—“For a while there it was forbidden that we say anything about climate change,” one informant said—and in 2006 the administration of George W. Bush actually downgraded the Coast Guard’s role in the Arctic by transferring budgetary authority over its icebreakers to the National Science Foundation (while still asking the Coast Guard to operate the ships). By 2010, one of the icebreakers had broken down and was being cannibalized for parts to support another, which was beyond its intended service life. The ships were unable to perform their missions, but without budgetary authority the Coast Guard could do little (U.S. Department of Homeland Security [DHS], 2011). As the situation worsened, the Coast Guard successfully lobbied to regain control of the icebreakers, and one retired officer involved in the negotiations said the service used Evergreen’s projections of increased nonscientific ice operations as a basis for its argument.

More significantly, several current and former top Coast Guard leaders maintained that Evergreen laid the intellectual foundation for the service’s Arctic strategy (USCG, 2013b, 2019) and, more concretely, for a lobbying effort that convinced Congress to fund the new Polar

Security Cutter—a ship intended to replace the failing icebreakers.¹⁷ One retired Coast Guard officer said:

[Evergreen] really has driven how we now script what we need for an icebreaker replacement. For instance, in years gone by we would have just had an icebreaker with primarily scientific space and equipment, supporting scientific operations, search and rescue, obviously the icebreaking, but not so much the anti-terrorism and law enforcement that we would do with all of our other assets. Now we're talking about a Polar Security Cutter and looking at it through a whole different lens.

That lens included the potential need to serve a national security function as Arctic nations, including Russia, might increasingly contest the space (as suggested by “Treading Water” in Evergreen III [USCG, 2013a, pp. 18–19]). In January 2018, Admiral Paul Zukunft, then commandant, spoke about the need to remain flexible in the face of far-future uncertainties. Although the Polar Security Cutter is designed to serve “cooperative” missions, such as search and rescue, he noted that, in designing the ship, the Coast Guard “reserve[d] the space, weight, and power necessary to fully weaponize these and make these a capable platform offensively in the event this world changes in the next 5, 10, even 15 years from now” (Zukunft, 2018, as quoted in Freedberg, 2018). Echoing a lesson many Evergreen participants made, he said, “You can't project out the status quo” (Zukunft, 2018, as quoted in Freedberg, 2018).

This example suggests how the Coast Guard was acting as a triple-loop learning organization. A single-loop Coast Guard would have continued to believe that the Arctic would remain frozen and only adjusted operations once conditions had changed. A double-loop Coast Guard would have questioned its assumptions about the future of the region as the ice began melting. But a triple-loop Coast Guard questioned its assumptions earlier in the process, as change was just beginning to manifest, because it was informed by imagination of the future

¹⁷ There is some difference of opinion within the Coast Guard about the extent to which Evergreen informed the Arctic strategy, but one admiral skeptical of the program's direct influence nevertheless cited its indirect influence, saying that the capacity Evergreen had built for longer-range thinking supported the strategy.

rather than just observation of the present (or experience of the past). This gave it an edge. Starting with Long View, the service was learning from the future.

How to Adapt to the Future

Ultimately, the point of Evergreen was not simply to inculcate the notion of thinking with an anticipation of the future, or thinking in terms of systems, or even thinking of time as a system. The purpose was to “future-proof” the Coast Guard—to use imagined futures to effect action in the present so that the organization would be able to perform well in the face of change and, in particular, surprise because, as the report of Evergreen I put it, “change and surprise have the potential to fracture the basic premises of the organization” (USCG, 2005, p. 1). The Coast Guard therefore needed the ability to “think over the horizon” in order that “the Service is and remains ‘always ready,’ no matter what the future may bring” (USCG, 2005, p. 1). As Allen put it, “This is kind of like trying to immunize the organization against a black swan or a slow erosion of something that becomes a big problem because it’s not known.”

The Coast Guard’s approach to the changing situation in the Arctic provides an example of this future-proofing, but the most dramatic surprise was the September 11 attacks, which radically expanded the Coast Guard’s mission.¹⁸ On September 12, 2001, the Coast Guard found itself implementing radically heightened port security measures. Whereas port security had previously accounted for 1%–2% of its daily operational load, it now consumed some 50%–60% (White House, 2002). A year later, the Maritime Transportation Security Act of 2002 officially tasked the service with assessing vulnerabilities of U.S. ports and ensuring adequate security for

¹⁸ It is also worth noting that the Coast Guard’s organizational position changed. In March 2003, control of the service passed from the Department of Transportation to the newly formed Department of Homeland Security.

them. And, by March 2003, Coast Guard personnel were securing ports and waterways in Iraq, following the U.S.-led invasion.

Long View, which issued its final report in 1999, had not foreseen the September 11 attacks, but it had considered several futures in which terrorism increased in the United States. More significant than the mentions of terrorism, however, was the report's determination that, "no matter how the future unfolds, the Coast Guard will face a complex operating environment characterized by new or unfamiliar security threats" (USCG, 1999a, p. 3). To meet that challenge, it declared, "The Coast Guard will enlarge its national defense role by acquiring the resources and developing the core competencies to provide homeland defense within the maritime domain, to include, among other things, border control, port security and anti-terrorism" (USCG, 1999a, p. 3). It was a remarkably prescient sentence for a time when "homeland defense" was not a national priority.

As noted earlier, the Coast Guard did not act quickly on Long View's 10 strategies, and the Long View Review judged that, had the service done so, it would have been in a better position to respond to the attacks and their aftermath. Nevertheless, Long View established an intellectual framework for several ideas that proved crucial in the post-9/11 world, in effect pressure-testing them under a range of possible futures, elevating them in priority, and socializing them among the Coast Guard leadership. This meant that, when the Coast Guard's mission shifted toward defending the homeland, the service was able to respond with greater alacrity—an organizational-level case of the point I made earlier about future-thinking enabling present-doing. As the Coast Guard's chief financial officer said:

When we had 9/11, we had a binder full of plans and ideas that, from 2003 to 2010, everyone said, "You're right—that's exactly what we need," and they started funding it. We watched our budget grow from about \$3 billion to almost \$11 billion in less than a decade. It was all after 9/11, and it was, I would say, largely because some of that

thinking and thought that had been done in the Evergreen model before 9/11 that allowed us to roll that out.

Two Long View strategies that the Coast Guard rolled out after 9/11 were Maritime Domain Awareness and the reorganization of the Coast Guard from functionally based commands into geographically based sectors.

Maritime Domain Awareness. The example that informants mentioned most frequently—and that Evergreen reports highlight (USCG, 2005, p. 6; USCG, 2008, p. 5)—is Long View’s emphasis on a concept known as Maritime Domain Awareness (MDA), defined as “the ability to acquire, track, and identify in real time any vessel or aircraft entering America’s maritime domain” (USCG, 1999a, p. 7). In other words, if any craft was approaching the United States by sea, the Coast Guard wanted to know what and where it was at all times. Although this may seem like an obvious need now, it was not a capability that the country had at the time. As one retired rear admiral explained, “[At the time] ships could come in 10 miles off, 3 miles off the United States’ coast, and we might not know it.” That was, in part, because there was no integrated system for gathering and disseminating information. One consultant to Long View said:

It seems impossible to think that, in 1998, we were still so backward in some of our thinking about networking and communications, but it was a sort of naive and infantile time in some ways. Back then, the communication-and-sensor silo for NOAA [National Oceanic and Atmospheric Administration] never spoke to the communication-and-sensor silo for Coast Guard, never spoke to DOT [Department of Transportation],¹⁹ who never spoke to the U.S. Navy. ... As we went through those scenarios [in Long View], one thing just became abundantly clear was that it was long past the time when we fixed that [lack of coordination].

Long View did not create the concept of Maritime Domain Awareness. What the scenarios made clear, however, was that there was no future in which the Coast Guard would not

¹⁹ At the time, the Coast Guard was still part of the Department of Transportation.

want a better understanding of who and what was at sea—greater situational awareness would always be a good thing. Long View took an oft-discussed concept and reified it as organizational strategy: “The Coast Guard will take a leadership role in defining and developing an integrated maritime management system” (USCG, 1999a, p. 5). Long View then informed the Coast Guard’s first strategic plan, which established MDA as a “long term, operational strategy” (USCG, 1999b, p. 14).

The service did not have the organizational and technological infrastructure to implement MDA immediately, but Long View established an intellectual foundation for the idea and built consensus among top leadership. As a result, amid post-9/11 concerns that the next terrorist attack could come by water and the resulting imperative to secure U.S. ports, the Coast Guard did not have to waste time vetting or socializing the idea of Maritime Domain Awareness. Long View had already established its value. As the 2005 Evergreen report noted, Long View “crystalized” the concept of MDA, which “has evolved into a critical organizing principle for the Coast Guard in its post-September 11th role in the new Department of Homeland Security” (USCG, 2005, p. 4). The Coast Guard’s leadership on Maritime Domain Awareness affirmed the service’s value at a time of great organizational upheaval.

Indeed, the Coast Guard’s early embrace of Maritime Domain Awareness enabled it to influence strategy at the national level. In January 2002, mere months after the attacks, the White House singled out the Coast Guard’s central role in MDA (White House, 2002). In December 2004, President George W. Bush established MDA as U.S. policy via National Security Presidential Directive–41 and Homeland Security Presidential Directive–13. Subsequently, the Coast Guard captain who had managed Evergreen I led the interagency process to develop the first National Strategy for Maritime Security (DHS, 2005b) and the corresponding National Plan

to Achieve Maritime Domain Awareness (DHS, 2005a). These ultimately led to the creation of the Nationwide Automatic Identification System—a sort of transponder system for ships—and today, Maritime Domain Awareness is a central component of U.S. homeland security efforts.

Reorganization. A similar process played out with respect to the reorganization of the Coast Guard’s command structure. Traditionally, the service had been divided between

“Operations” and “Maritime Safety.” A retired operator explained:

Long View and Evergreen both really kind of came across this notion that there was two main stovepipes at the working level in the Coast Guard. The Coast Guard that I grew up in for 80 percent of my career was, you were either an “M” guy or you were an “O” guy. “O” was operations. Operations was the guys driving small boats, the guy who is driving ships, the guys flying helicopters. “M” guys—we called them the “safety weenies”—they were the maritime safety. They were the boat inspections. They were the regulations and stuff like that. The O guys didn’t think those guys were at the pointy end of the spear. But it became apparent as you started looking through Long View and Evergreen, that really those are different sides of the same coin when it came to defining overall maritime security. You had to have both pieces.

Not only did this distinction between “O” and “M” make little sense substantively, but it also led to failures of communication and coordination because each silo had its own command, so there were multiple authorities in any given port. The Government Accountability Office provided Congress an illustration of the problem, noting:

A marine safety officer who had the authority to inspect a vessel at sea or needed an aerial view of an oil spill as part of an investigation would often have to coordinate a request for a boat or an aircraft through a district office, which would obtain the resource from a group or air station. (GAO, 2006, p. 11)

The Coast Guard had begun to recognize this problem in the mid-1990s, but reorganizing a military service is no mean challenge. So in 1996 it had established what it called “Activities New York” and “Activities Baltimore”—two prototype commands in which a single officer was responsible for all of the service’s activity in those ports.

As these prototype commands tested the logistics of reorganization, Long View tested the idea against a wide range of plausible futures, finding no circumstance under which it made sense to have a functional divide that resulted in overlapping commands. The number of circumstances under which O and M would have to work together was only going to increase. So, two of the 10 strategies that Long View produced explicitly addressed the problem—one by recommending that a cross-programmatic approach replace a program-focused approach, and one by recommending that the organization adopt a “geographically based unified command structure” (USCG, 1999a, pp. 5–6). In practice, this meant that the Coast Guard should dissolve the O and M directorates and integrate proximate commands, creating geographic areas of responsibility with a single officer in charge. However, as noted earlier, the Coast Guard did not move quickly to institute the changes Long View recommended. Although Long View did catalyze and support pre-9/11 strategic discussions between the programmatic silos, they remained in place—except in Baltimore and, crucially, New York.

The September 11 attacks finally spurred the Coast Guard to reorganize its command structure because the presence of a unified command in New York facilitated its superior response (Capelotti, 2003, pp. 12–14). As Thad Allen put it to me: “I believe that had we not had a consolidated command in New York ... we would not have been as successful as we were that day in coordinating the evacuation of maybe up to a half a million people off of Lower Manhattan”—the “American Dunkirk” described in this paper’s opening paragraph. But Long View was essential to the subsequent reorganization because, as with Maritime Domain Awareness, it had laid the intellectual framework for the idea. September 11 may have been the spark, but Long View provided the fuel that enabled the Coast Guard to abolish its organizational silos and to group command responsibilities by geographic sector. A retired vice admiral stated:

I was at the execution end of that, but I have to take that [idea] directly back to the scenario planning and work that Admiral Thad Allen had done, the visioning that he had done when he was the chief of staff and driving the Evergreen process forward.

“Scrappy Foresight”

Ambidexterity improves adaptation to environmental change, and scholars have therefore suggested that ambidexterity may serve as a dynamic capability, enabling competitive advantage over the long term (O’Reilly & Tushman, 2008), which is akin to saying that ambidexterity may facilitate strategy under the uncertainty of the long-term future. In fact, early work on dynamic capabilities framed the question in just this way, specifically citing the need for firms to simultaneously exploit and explore in order to compete successfully over time despite uncertainty (Teece et al., 1997, p. 515). This raises the question of whether it would be theoretically useful to view strategic foresight—a tool that enables the formulation of strategy under uncertainty by easing the tension between exploration and exploitation—as a dynamic capability. Elsewhere, I have suggested that the promises of strategic foresight align with what Teece (2007) called the “microfoundations” of dynamic capabilities: sensing, seizing, and reconfiguring (Scoblic, 2020). And Bodwell and Chermack (2010) have argued that scenario planning is, in fact, a dynamic capability that can enable managers to act ambidextrously.

On the surface, Long View and Evergreen suggest that strategic foresight could be a dynamic capability because they enabled the Coast Guard to adapt in the face of discontinuous change. The service did this through an organization-level sensing activity (scenario planning) that prompted it to seize strategic opportunities (e.g., to push Maritime Domain Awareness as a national priority) and to reconfigure its asset base (e.g., to establish the system of sectors) in an attempt to improve evolutionary fit. However, a closer examination of the Coast Guard’s efforts

suggests that the dynamic-capabilities construct may obfuscate more than it clarifies—or perhaps that a broader conception of that construct is warranted.

Scholars conceive of dynamic capabilities in various ways (Schilke et al., 2018), but a common theme is that dynamic capabilities are difficult to acquire, maintain, and replicate. To disaggregate, dynamic capabilities are:

- (1) Path-dependent. They are patterned activities—not simply ad hoc responses—and as such are built up over time within the context of a particular organization (Helfat & Martin, 2015), emerging “from each firm’s unique history, investment, culture, experience, and problem-solving techniques” (Schoemaker et al., 2018, p. 19).
- (2) Experiential. They are a function of organizational experiences. They may then be reinforced and embedded via the cognitive processes of knowledge articulation and codification (Zollo & Winter, 2002), but per Pisano (2000), the idea is: “The seeds of today’s capabilities are sown in yesterday’s experience” (p. 150).
- (3) Costly. Because they are particular to an organization, dynamic capabilities are difficult to sell, meaning they entail significant sunk costs (Winter, 2003). “Thus, obtaining a systematic means to promote strategic change through dynamic capabilities requires a substantial commitment of organizational effort, time, and funds” (Schilke et al., 2018, p. 393).
- (4) Fragile. Not only are they costly to initiate, but they also require “constant energy” to maintain (Eisenhardt & Martin, 2000, p. 1113), involving “a lot of specialized personnel who are committed full-time to their change roles” (Winter, 2003, p. 993).
- (5) Inimitable: The reason for the definitional focus on path dependence, experience, cost, and fragility is that dynamic capabilities are supposed to provide a foundation for

sustained competitive advantage, which is considered the “Holy Grail” of strategy (Helfat & Peteraf, 2009, p. 91). If it were easy to imitate a given dynamic capability, every firm would do so and any advantage the capability conferred would be competed away.

By contrast, Long View and Evergreen have been:

- (1) Idiosyncratic. Far from being a function of the organization’s history, Long View marked “an inflection point” for the Coast Guard from ad hoc reaction to anticipatory intent. It was created at the direction of a commandant—Admiral James Loy—who had been inspired by meeting a former staffer for the chief of staff of the Air Force. Loy was assisted by a few like-minded individuals, most notably Thad Allen, who served as chief of staff and then became commandant himself. Asked to what extent Allen was responsible for Evergreen, one informant said, “I’d say it’s as close to 100 percent as you can get.” Meanwhile, the hiring of the Futures Strategy Group—the consulting firm that would run Long View, the Long View Review, and the first three Evergreens—was the result of a chance meeting at a conference.
- (2) Cognitive: To some degree, any cognitive process is rooted in experience, but the cognitive aspect of Evergreen relies chiefly on imagination. Indeed, Evergreen seems to work by *relieving* participants of experience. The purpose of generating far-future scenarios is precisely to force participants to break with the present so as to challenge existing mental models. One informant said: “The first thing, if you’re going to think outside the box, you have to understand the box you’re in. I think that [Evergreen] gave people some space to sit back and think about the Coast Guard and its place in government, and what it was doing, just from a totally different perspective.” In effect, Evergreen worked by providing participants a sense of psychological safety (Edmondson,

1999) and creating a “liberating structure” (Torbert, 1991). One retired officer said, “I liked Evergreen because it gave permission for people to be smart, to share their ideas, to do so in an environment in which there was no bad idea.”

(3) Thrifty: Evergreen has generally required two full-time employees (out of 50,000) and approximately \$500,000 a year in contractor fees (out of a budget that is currently \$12 billion). Other Coast Guard personnel are involved part-time: Approximately 12–20 people served on the “core teams” of Evergreens I, II, and III, giving about 10% of their time. Convening workshops does require travel money and participants’ time, but those costs can be minimized (e.g., by tacking a workshop onto a preexisting conference). Informants overwhelmingly categorized Evergreen’s cost as small: “The amount of organizational effort required to do Evergreen is tiny. ... I think they spend more time figuring out how to do parking permits at headquarters,” one officer said.²⁰

(4) Persistent: Although Loy said that “this idea can die in an organization that doesn’t have drive from the top,” Evergreen has endured wildly fluctuating levels of top-leadership support, as commandants change every four years. Loy and Allen were clearly both essential to Long View and Evergreen, but informants noted that other commandants have been significantly less enthusiastic. Nevertheless, the foresight program has endured for over 20 years, in part because alumni form a cadre of supporters—some of whom have risen through the ranks, giving them the ability to champion the program. At one

²⁰ Several informants pointed out that one must also consider the costs of *not* doing foresight. As one former pilot said, referring to the Coast Guard’s decision to replace some of the turboprop planes it had traditionally flown with the HU-25 Falcon jet:

[Evergreen costs] nickel-and-dime change in an organization like the Coast Guard. It’s not that expensive. What’s *not* nickel-and-dime change is buying—shit, I don’t know how many Falcon jets we had. We had a shitload of them, and we flew them for 30 years. We made it work, but it was a stupid plan for the Coast Guard.

The Coast Guard bought 41 Falcons at a cost of approximately \$100 million—and ultimately replaced them with turboprop planes.

point, Evergreen appeared to have been kept alive through the efforts of a single midlevel officer who reconfigured the exercise to match the commandant's interests. Today, informants say the program is enjoying a renaissance.

(5) Replicable: Although Evergreen has become a patterned activity, it is important to note that personnel are constantly rotated. Program managers had often had little to no contact with Evergreen before being tasked to run it. Most, if not all, had operational backgrounds—as pilots, ship drivers, etc. They learned on the job, and they rotated back to the field after their tour at headquarters. It is therefore hard to argue that the Coast Guard's capability to conduct scenario planning or to formulate strategy was a function of difficult-to-imitate experience. To the extent that there was a common thread, it was the Futures Strategy Group, which served as the contractor for Long View, Evergreen I, Evergreen II, and Evergreen III, and which played a key role in constructing scenarios and facilitating workshops. But that only reinforces the point. There are many consulting firms that can provide such services, meaning there is nothing obviously inimitable about Evergreen.

Although strategic foresight may not be a dynamic capability, at least as generally construed, the comparison is nevertheless instructive because it suggests a remarkable conclusion: Strategic foresight is valuable—and not expensive. Through the envisioning of multiple futures, it enables organizations to take action in the present so that they may more effectively adapt to environmental change. Initially, a foresight program, like Evergreen, requires the strong support of top leaders, but it can be scrappy, persisting in the face of indifference or even opposition. Perhaps most notably, this analysis demonstrates that imagination is a key strategic resource, enhancing the organization's ability to sense, shape, and adapt to the future.

As one informant said: “Imagination is a tremendous capability for an organization to have. For the most part, it doesn’t cost anything.”

CONCLUSION

In this paper, I asked how firms make strategy under the uncertainty of the long-term future, and I proposed strategic foresight, specifically scenario planning, as a possible solution, given that practitioners have long touted its ability to do just that (e.g., Schwartz, 1991; van der Heijden, 1996; Wack, 1985a, 1985b). Despite such claims, however, scenario planning has drawn little attention from management scholars, and the few studies in top journals reach contradictory conclusions about the technique’s effectiveness (Kuhn & Sniezek, 1996; Meissner & Wulf, 2013; Phadnis et al., 2015; Schoemaker, 1993). Instead, the organizational and strategy literatures prefer to study “foresight” as foreknowledge (e.g., Gavetti & Menon, 2016)—a mistake given the unreliability of long-term prediction (Tetlock & Gardner, 2015, pp. 243–244). Meanwhile, scholars of futures studies lament their discipline’s theoretical disarray (Bouhaleb & Smida, 2018; Iden et al., 2017; Rohrbeck et al., 2015). As organizations contend with increasing environmental uncertainty, strategic foresight could be a vital capability, and a stronger theoretical foundation would facilitate knowledge production. Strategic foresight may also help resolve persistent questions in the management literature. In that spirit, I use this study of the U.S. Coast Guard to make three theoretical contributions.

First, I demonstrate that overcoming short-termism demands a structure for addressing and engaging the uncertainty of the long-term future. Because short-termism is, in part, a mechanism for avoiding the uncertainty of the long term, organizations can counteract it only if they offer a (replacement) compensatory mechanism for managing that uncertainty. They must

answer “how?” before they can attend to “how much?” Although various demands and incentives conspire to keep private- and public-sector organizations focused on the present, removing those forces—even if possible—is no guarantee of greater attention to the long term or better attention to the long term. The uncertainty of the far future is disorienting, and the need to develop long-term strategy can be more burden than opportunity. Project Evergreen demonstrates not only that scenario planning can structure such strategizing in an adaptive way, it also demonstrates that it is possible to weather an increase in pressure to focus on the present—as the Coast Guard experienced with its new post-9/11 missions—while still increasing attention to the long term.

Second, that ability to simultaneously increase attention to the present and the future resolves a persistent question in the literature on exploration and exploitation: namely, how can managers tolerate paradox? The concept of organizational ambidexterity addresses the supposed strategic contradictions between these two activities by structurally differentiating them, but a significant problem remains: For the organization’s activities to cohere, top managers must ultimately reintegrate those activities. As O’Reilly and Tushman (2008) note: “An important future research direction is to further understand the characteristics and process of senior teams that are able to attend to and deal with the contradictions and paradox associated with exploration and exploitation” (p. 201). Here, I argue that the key to the “paradox” may lie in a form of cognitive ambidexterity, wherein managers come to perceive exploration and exploitation as complementary rather than as competing.

Relatedly, while the need for firms to be able to operate in both the present and the future is implicitly or explicitly part of the enormous body of research on ambidexterity—exploitation concerns the present, and exploration concerns the future—little of that work emphasizes the role

that managerial conceptions of time play in ambidexterity. This is a strange elision. To be sure, some scholars have articulated a need for organizations to become “temporally ambidextrous” (Slawinski & Bansal, 2015, p. 544) or to engage in “ambitemporality” (Reinecke & Ansari, 2015), and several studies have explored how they might integrate multiple time frames (Kaplan & Orlikowski, 2013; Orlikowski & Yates, 2002; Papachroni et al., 2015). Yet this line of research remains under-developed. As one review essay on time and strategic change noted, “An important topic for such research will be the ability of organizations to hold multiple sides of temporal differences as opposed to casting one against the other” (Kunisch et al., 2017, p. 1049). Here, I offer that scenario planning can instill this ability by shifting mental models of time from linear to loopy.

Finally, in presenting “scrappy foresight,” I offer an approach to managing the uncertainty of the future that differs markedly from that offered by the research on dynamic capabilities that is so prevalent in the strategy literature. Like strategic foresight, the concept of dynamic capabilities rests on the belief that rapid environmental change requires organizations to be both forward-looking and adaptable. But, because dynamic capabilities are difficult to imitate—path-dependent and experiential—research on them offers few clues as to how an organization that is not already adept at navigating uncertainty could become so. Absent significant investment over time, organizations would seem to be stuck with the degree of dynamism that they have. As demonstrated by the experience of the Coast Guard and its scrappy foresight effort, I maintain that it is possible to change the organization’s capacity to change by leveraging the power of imagination—by learning from the future.

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