Frank Knight was one of the most notable economists of his generation. A founder of the Chicago school, he mentored four Nobel laureates, served as president of the American Economic Association, and was a charter member of the Mont Pelerin Society. 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.”1 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.2 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

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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.”3 As for how to do great and decisive things, he was unclear. Management, he wrote, was an “art” not a “science,” and given the unpredictability of the future and the elusive determinants of good judgment, strategy was “a delusion.”4 As a result, Knight 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 legacy. Knight may have been a giant roaming the Economics Department at Chicago, but his notion of uncertainty catalyzed little theoretical elaboration or empirical research.5 By mid-century, economics had embraced formal modeling that did not allow for ghosts in the machine, and Knightian uncertainty threatened the discipline’s neoclassical foundations.6 By contrast, the impact of uncertainty on organizational theory was tremendous. Ronald Coase’s path-breaking paper “The Nature of the Firm” was explicitly based on Knightian uncertainty.7 The work of Herbert Simon, who crossed paths with Knight at Chicago, has clear antecedents in Risk, Uncertainty and Profit, which essentially defined “bounded rationality” avant la lettre.8 And contingency theory was a response to the uncertainties stemming from the

3 Knight, 24.
4 Knight, 24.
organization’s interaction with its environment. Indeed, the centrality of Knightian uncertainty to so many areas of organizational behavior, has prompted a fresh wave of attention in the management literature. Obviously, Knight was not the only economist to write about uncertainty, but he was the one who left the concept on management’s doorstep, an orphan of analogy crying out for judgment.

The purpose of this paper is to pick up where Knight left off—to reinterpret his seminal work and to trace the work of a group of thinkers, most notably Herman Kahn, who, galvanized by the specter of uncertainty, developed qualitative methods for bounding it. 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. That humility was appropriate. The nuclear revolution—in which the United States and the Soviet Union acquired the ability to destroy each other as functioning civilizations in a matter of minutes—was perhaps the epitome of Knightian uncertainty, a situation utterly devoid of historical analogy. Uncertainty was therefore a practical 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 uncertainty demanded by, in essence, manufacturing analogy. In


Knight teed up the question—What made 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 business managers.

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**

Intellectual paradox marked Frank Knight from his earliest days as a scholar to his parting address to the American Economic Association: “The right principle is to respect all the principles, take them fully into account, and then use *good judgment* as to how far to follow one or another in the case in hand. All principles are false, because all are true—in a sense and to a degree.”\(^\text{12}\) He was a friend of Friedrich Hayek and a founder of the libertarian Mont Pelerin Society, but he once insisted students vote communist.\(^\text{13}\) He believed that economics was a true and exact science, like mathematics, but he did not believe that it accurately described human behavior. He was a founder of the Chicago School of economic thought, which later rejected much of his work because “uncertainty” contradicted neoclassical assumptions.


Uncertainty was many things to Knight. At the disciplinary level, it was the mechanism that explained profit, innovation, and organization. Uncertainty was also the tool through which Knight injected humility into a discipline drawn to oversimplified models and doubt into a society increasingly enamored of social progress through top-down control. Psychologically, uncertainty was double-edged, generating tremendous anxiety but also enabling free will. At the most fundamental level then, uncertainty was not only a concept that Knight felt vital to the preservation of economics, society, and humanity, it was also the epitome of his intellectual style, forever pulling in two directions, never reaching equilibrium.

Nevertheless, Knight’s definition of uncertainty—and its distinction from risk—is often woefully misunderstood. In his most pithy (and oft-cited) summation, he 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 \textit{a priori} or from statistics of past experience), while in the case of uncertainty this is not true.”\textsuperscript{15} Ironically, this simplification obscured the very concept that he was using to preserve complexity.

Most importantly, the focus on the dichotomy between risk and uncertainty obscured the fact that, for Knight, these concepts lay on a spectrum marked by “degrees of uniqueness” determined by how easy it was to find historical analogies that comprised a class of events from which you could infer 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.”

\textsuperscript{15} Knight, \textit{Risk, Uncertainty and Profit}, 233.
However—and this is a crucial point often overlooked in summaries of Knight—there is actually no clear dividing line between risk and uncertainty. Knight wrote that situations of true risk are rare because “entirely homogenous classification of instances is practically never possible.” Conversely, instances of true uncertainty are rare because “it probably never happens that there is no basis for comparison.” So, the difference between risk and uncertainty is “a matter of degree only.” 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. Richard Zeckhauser 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. In it, there is no way that one can sensibly assign probabilities to the unknown states of the world.”

In truth, Knight explicitly subsumed “ignorance” under “uncertainty,” noting the existence of “occurrences so revolutionary and unexpected by any one as hardly to be brought under the category of an error in judgment at all.”

Modern readers might call these “black swans”—events that cannot be imagined until they have been observed—but just as events are more or less unique, they are also more or less imaginable.

This notion of degrees also deflates the chief criticism of Knight—the one that made his work so unimportant to economics: the notion that he did not allow for subjective probability

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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 objective probabilities, they acted as if they did so, thus preserving economic rationality.\(^\text{19}\)

However, to Knight, uncertainty was in fact a “type of probability judgment”—one that, he argued, was largely intuitive. Knight felt that most decisions were too unique to permit “any inference of value about any real probability.”\(^\text{20}\) 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.”\(^\text{21}\) If not, decision-making would grind to a halt. But, in such cases, we are acting upon “opinion” rather than “scientific knowledge.” In other words, “uncertainty” is synonymous with the formation of subjective probability estimates. Where Knight differed was in the value of such estimates, which he felt were prone to error. He recognized that some people had better judgment. He just did not know how it worked: “The ultimate logic, or psychology, of these deliberations is obscure, a part of the scientifically unfathomable mystery of life and mind.”\(^\text{22}\)

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.\(^\text{23}\) The furthest he would venture was to write that all knowledge was based on experience. And yet: “Here is a paradox: experience is the only source of knowledge, yet experience proves nothing.” It is possible to draw all sorts of erroneous conclusions from one’s experiences. The question, then was how to

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\(^\text{20}\) Knight, *Risk, Uncertainty and Profit*, 226.
\(^\text{21}\) Knight, 226.
\(^\text{22}\) Knight, 227.
\(^\text{23}\) In 1926, he did draft an outline for an economics textbook, in which he once again emphasized that uncertainty is a matter of degree. (Frank H. Knight, “Untitled Economics Textbook,” Chapter XI, 1926. Frank H. Knight Archives, Regenstein Library, University of Chicago, Box 32, Folder 5.) But, when it came to the topic itself, he had seemingly had no interest in delving further. In the preface to the 1956 reissue of *Risk, Uncertainty and Profit*, he 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.”
distinguish one from the other. “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.”

RAND

Unfortunately, science was not up to the task. In the years after World War II, American scholars thought they would soon be able to codify and quantify human behavior. A burgeoning cadre of civilian defense intellectuals seized on the wartime success of operations research—statistical methods the Allies had used to optimize military tactics—as a way to replace the judgment of the professional soldier with the putative rationality of mathematical models. Similarly, managers embraced quantitative methods and the rationalist zeitgeist, institutionalizing corporate planning in vast departments designed to maximize efficiency and control. A quantitative push also invaded the social sciences, which now advanced the notion that humans obeyed natural laws in the same way that physical phenomena did. Across the military, business, and the academy, then, epistemological 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 national security—particularly in figuring out how to cope with the ramifications of the nuclear

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revolution, which seemed to render centuries of martial wisdom obsolete. War, in the eyes of RAND’s scholars, had too long been an “art.” Operations research had provided the United States with a taste of what a more rational approach could accomplish. The scientists at RAND wanted to develop a science of warfare that would put “rationality” in place of military instinct and judgment, which one top RAND advisor derided as the “disorganized and feebly intuitive shadows of a real analysis.”

And, yet, in the 1950s, at a time when rationalism was ascendant, in a place dedicated to the proposition, and among the people within that institution most dedicated to it, qualms about uncertainty flourished. Knightian uncertainty thus passed a sort of “crucial case test,” demonstrating just how hardy a creature it was. What’s more, Knightian uncertainty provides a lens for understanding some of RAND’s work. At RAND, Knight’s mystery of good judgment, so central to management, found an answer—or at least the beginnings of one.

The proximate cause of uncertainty’s salience was the utter failure of the earliest iterations of systems analysis—an ill-defined methodology that essentially sought to scale operations research to the strategic level, optimizing “military worth” of entire wars. One of RAND’s first charges was, effectively, to devise the country’s first nuclear strategy. Unsurprisingly, despite modeling more than 400,000 different bomber configurations—a task so data-intensive that RAND had to build a new computer to handle the calculations—the effort failed miserably.

To be sure, its final report was “an intellectual tour de force,” as historian David Jardini writes. It “brimmed with elegant mathematical and economic analyses, graphs, 

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charts, and optimization tables.”28 The problem was that, in an attempt to develop an algorithm
that maximized sorties while minimizing cost, analysts had simplified some variables (e.g., the
Air Force would have to fly turboprop planes instead of its next-generation B-52), wildly
misstated others (e.g., the amount of fissile material available), and quantified the unquantifiable
(e.g., the value of a pilot’s life).29 When the Air Force rejected the study, it ended 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. One finds it in
Albert Wohlstetter’s warning that signs of a Soviet attack would be ambiguous: “We can state,
unequivocally, that they will be equivocal.”30 One finds it in Daniel Ellsberg’s graduate work,
which was an explicit defense of Knight against Savage, in which he articulated a new category
of uncertainty: “ambiguity.”31 One finds it in the writings of Charles Hitch, the head of RAND’s
economics section and president of the Operations Research Society of America, who, like
Knight, distinguished between “insurable risk” and “genuine uncertainty.”32 Following early
missteps, RAND’s analysts would quantify what they could but would acknowledge the need for
judgment. Theirs would be an “intuitive science,” as Sharon Ghamari-Tabrizi has put it.33 Yet
recognizing the persistent need for judgment was only the first step toward improving it. Which
is where Herman Kahn came in.

28 David Jardini, Thinking through the Cold War: RAND, National Security, and Domestic Policy, 1945-1975
29 Jardini, Thinking Through the Cold War.
30 A.J. Wohlstetter, F.S. Hoffman, and H.S. Rowen, “Protecting U.S. Power to Strike Back in the 1950’s and
1960’s” (Santa Monica, CA: The RAND Corporation, September 1, 1956), 19.
643–69.
33 Sharon Ghamari-Tabrizi, The Worlds of Herman Kahn: The Intuitive Science of Thermonuclear War (Cambridge,
Herman Kahn

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, and he quickly specialized in Monte Carlo analysis, a method for estimating the distribution of values for random variables. John von Neumann and Alexander Ulam used this technique to estimate the random behavior of neutrons in designing the hydrogen bomb. Neither theory nor conventional simulation could deal with this problem, but one could sample the behavior of neutrons, particularly if one had a computer, which in the late 1940s they did with the JOHNNIAC.34 "Monte Carlo," Kahn wrote, "is a method of getting answers when almost all else fails because the problem is so complex."35

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—who had studied under Frank Knight and been profoundly influenced by his definition of uncertainty—published a paper on reducing the sample size needed to run Monte Carlo simulations, thereby facilitating its application.36 Kahn even began writing a book on the subject and finished a draft RAND report before becoming bored with the project, finding it "tedious in the extreme."37 Later, in 1957, he would note that overuse of Monte Carlo was a "common pitfall" of modelers too enamored of the tool: "A Monte Carlo

36 Kahn and Marshall, “Methods of Reducing Sample Size in Monte Carlo Computations.”
problem done in a completely straightforward fashion is almost prima facie evidence of insufficient thought.” 38

In his disillusionment, he parted with RAND’s physicists in the mid-1950s and joined its system analysts. In 1957, he and Irving 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.” 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 almost no conceptual difficulties in treating it—it merely makes the problems computationally more complicated.” 39 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.” 40

The problem of uncertainty stemmed not only from the complexity of war generally, but from the revolutionary character of nuclear war specifically. Kahn 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.” 41 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.

38 Herman Kahn and Irwin Mann, “Ten Common Pitfalls” (Santa Monica, CA: The RAND Corporation, July 17, 1957), 11.
41 Herman Kahn, On Escalation: Metaphors and Scenarios (New York: Praeger, 1965), 134.
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. As Kahn’s colleague Bernard Brodie had written several years earlier: “It is self-evident that national objectives in war cannot be consonant with national suicide.”

Nuclear war was the ultimate case of judgment under uncertainty. The uncertainty stemmed from the fact that no one had ever fought a nuclear war before. 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 systems analysts could do their best to improve judgment by quantifying what they could, 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. In other words, it would come down to judgment: “In any question as complex as that under discussion, one must, in the long run, depend on informed judgment and intuition in addition to rigorous analysis,” Kahn wrote. The question of the day, then—it is hard to think of one more significant—was how to improve that judgment in the absence of experience.

It was perhaps the most extreme version of the problem that Knight had posed. But where Knight had shrugged, Kahn suggested an answer: “ersatz experience.” That is, if the past could not provide an 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,

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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 Dr. Strangelove.45 As Kahn wrote in On Thermonuclear War, before
launching into a detailed description of what the 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.”46 What were needed were “some strange aids to thought.”47 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.48 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 also added a degree of 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

45 Herman Kahn, Thinking about the Unthinkable (New York: Horizon Press, 1962); Fred M. Kaplan, The Wizards
46 Kahn, On Thermonuclear War, 162.
47 Kahn, Thinking about the Unthinkable.
48 Daniel Bessner, “Organizing Complexity: The Hopeful Dreams and Harsh Realities of Interdisciplinary
Collaboration at the Rand Corporation in the Early Cold War,” Journal of the History of the Behavioral Sciences 51,
decision made during the course of the game. This also meant that game results, unlike those of a laboratory experiment, were not replicable.49

But to Kahn war games “encouraged the development of several degrees of understanding.” 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.”50 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” 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 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.”51 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.”52 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.”53 But there was no reason a scenario—

50 Kahn, Thinking about the Unthinkable, 157.
51 Herman Kahn and Irwin Mann, “War Gaming” (Santa Monica, CA: The RAND Corporation, July 30, 1957), 12. Underlining in original.
52 Kahn and Mann, 12.
53 Kahn and Mann, 13.
“some hypothetical sequence of events” that served as the basis for the game—could not be constructed and considered on its own, because 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.”

Almost like a one-person war game, scenarios forced you to ask “what if?” and construct a plausible (or even somewhat implausible) chain of events in your own head. So, when Kahn left RAND and founded the Hudson Institute in 1961, he put much of his energy into constructing scenarios. 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.” 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 other words, scenarios, like games, could create classes of events where none existed, thereby reducing degrees of ignorance and uncertainty.

CONCLUSION

The techniques of war-gaming and scenario planning 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. But the fundamental effect on

54 Kahn, *Thinking about the Unthinkable*, 143, 145.
55 Kahn’s scenarios resemble the sort of “informal game” that he mentioned in Kahn and Mann, “War Gaming,” 3-4: “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.’”
management 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. Strategy, it was argued, was a rational process of matching means to long-term goals and so corporate planning departments—which by definition relied on prediction—spread to the point that John Kenneth Galbraith wrote of the rise of an expert managerial “technostructure.” According to Stephen Barley and Gideon Kunda: “Planning, forecasting, and controlling were to be the manager's watchwords.” 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 enormous instability—one marked by revolution—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 the degrees of uniqueness—and therefore the degrees of uncertainty—present

in the Cold War. This marked a significant step toward answering Knight's question of how we
formulate strategy under such conditions—one that emphasized adaptability over planning in
what would ultimately become known as the “learning school” of management, which held that
strategy must be not only “deliberate” but “emergent.”62

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.