Simon and Knight

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Reason, then, goes to work only after it has been supplied with a suitable set of inputs, or premises. If reason is to be applied to discovering and choosing courses of action, then those inputs include, at the least, a set of should's, or values to be achieved, and a set of is's, or facts about the world in which the action is to be taken. Any attempt to justify these should's and is's by logic will simply lead to a regress to new should's and is's that are similarly postulated. (Herbert A. Simon, 1983b, p. 7)

ABSTRACT

This chapter contrasts Simon's approach with that of Frank Knight, who was a significant figure in the Chicago economics department at the time. It explores how Simon's ideas, such as bounded rationality and satisficing, have been influential in fields like management and artificial intelligence, despite being somewhat overlooked by mainstream economics and public administration.

INTRODUCTION

When Simon began his undergraduate studies in 1933, Knight was head of Chicago's economics department (Emmett, 2009). Under Knight's leadership, the department evolved into America's most powerful (Knight, 1999; Van Horn et al., 2011). It was home to many Nobel Prize-winning economists, including James Buchanan, Milton Friedman, and George Stigler; all were Knight's students. Today the school is both admired as the world's leading school of economics and vilified as a font of 'neoliberalism' (Emmett, 2010; McKinney, 1975; Medema, 2014; Van Overtveldt, 2007).

Simon's intent was to study economics and 'harden' it with mathematics (Simon, 1997b, p. 196). But learning he would have to take accounting, he switched into Charles Merriam's political science department. This did not cut him off from Knight's department, for Merriam's was loosely run. Students were able to cut classes or take them in other departments as they chose – as long as they passed their exams (Simon, 1991, p. 39). Simon built his own curriculum, skipping courses he felt inappropriately oriented or taught, adding others that interested him more. He was greatly influenced by Henry Schultz, an economics department member, and became one of his research assistants. He also attended lectures by others such as Henry Simons, whom Knight had brought to Chicago from the University of Iowa where he had been one of Knight's star students. Simons' Positive Program for Laissez Faire was later regarded as neoliberalism's 'manifesto', setting the intellectual and political strategy for Chicago's economics department post-Knight (Emmett, 2009; Simons, 1934). As Simon recalled, Henry Simons opened his eyes to how to apply mathematics to economics (Van Overtveldt, 2007, p. 158). Simon also studied with many of the economics department's students, including Stigler, who enrolled in 1933, and Friedman, in 1934 a master's student and another of Schultz's research assistants.

This chapter explores how Simon's studies with Schultz, Simons, and others in Chicago and, perhaps, of Knight's own work, impacted his own. It is speculative,

offered to encourage others to investigate the topic further given that Simon's influence, while recognized as huge, remains more puzzling than it should be (Crowther-Heyck, 2005, p. 324; Foss, 2001; Sent, 2005; Spender, 2013). Starting out in public administration yet awarded the 1978 Nobel Memorial Prize in Economics, Simon is largely ignored by mainstream economists and public administration theorists alike (Foss, 2003). Today, his reputation seems greatest among scholars of business or of computing. The signature concepts he coined – bounded rationality, satisficing, and heuristics – are taken for granted by management and AI scholars, yet poorly understood (Cristofaro, 2017; Gigerenzer, 2004, 2021; Romanycia and Pelletier, 1985). At the end of his life, Simon felt his major contributions were in the disciplines of individual and 'computational' psychology and in the 'sciences of the artificial' (Simon, 1981, 2001).

Rather than compare Knight's and Simon's ideas point by point, I review the occasions when Simon disputed others more aligned with Knight's thinking. These battles generated a trail of publications marking some boundaries to Simon's thinking, frontiers that also explored the limits of academic insult. Some fights were epic and are well known, others less so but equally revealing. My conclusion is that Simon hewed to a single project throughout his career, his self-confessed 'monomania', but, ironically, he missed learning about its limits from Knight himself (Simon, 2001).

What do scholarly disagreements amount to? I view language making and affirming as the core academic activities, leading to 'bounded islands of theory-language' that can be applied to a variety of concerns, conceptual and empirical. These islands get institutionalized into disciplines. Disputes are typically confrontations between language islands. But the islands always allude to each other, elements of the shifting universe of our community's knowing that, being of our own construction, we cannot escape. Thus, my agenda is anti-positivist and Knightian rather than logical positivist in the manner Simon claimed (Simon 1991, p. 44; Hammond, 1991). Simon's ideas and methods were anything but naïvely positivist. His towering achievement was to help create the rapidly expanding islands of AI language and practice that now threaten to engulf our lives. Knight's objective was totally different, to explore an ethics of real-world economics which, inter alia, we might deploy to explore the limits of AI.

FRANK KNIGHT

Prior to World War II, Knight was the defining figure of the Chicago School and of American economics. We know Simon read Knight's Risk, Uncertainty and Profit (henceforth referred to as RUP) for his PhD (Knight 2006 [1921]). Yet there is no evidence of personal interaction between Knight and Simon in Chicago or elsewhere. There are four cursory footnotes to RUP in Administrative Behavior (henceforth referred to as AB) (Simon, 1976), yet no mention of Knight in Simon's Models of My Life (henceforth referred to as MML) (Simon, 1991), and few mentions in the rest of Simon's vast oeuvre. Hunter Crowther-Heyck's comprehensive biography of Simon (The Bounds of Reasoning in America; henceforth referred to as BRA) did not consider Knight an influence (Crowther-Heyck, 2005, p. 64). Nor was there any mention of Knight's influence in my previous exploration of Simon's thinking (Spender, 2013).

Knight was one of the most influential economists of the post-Marshall era, introducing Knightian uncertainty into economics' language (Hicks, 1931). Despite some disagreements, his thinking overlapped with that of the 'Austrians' Ludwig von Mises and Friedrich Hayek, who theorized knowledge and efficient markets and contributed greatly to

neoliberalism's rise. While Knight regarded market competition as a fundamental democratic freedom, he did not find the abstractions of neoclassical economics usefully informing. He eventually focused instead on the ethics of economics and 'social philosophy' (Knight, 1982a). He recommended comparing perfect market notions with real-world institutional notions to illuminate the nature and boundaries of each. But both Knight and Simon sought to research real-world economic practice rather than the abstractions of 'price theory' and to query the limited insight into human behavior provided by the notion of 'perfect rationality'.

That said, the principal challenge to exploring whether Simon's thought relates to Knight's is Simon's scant attention to Knight. Notwithstanding, institutional and academic networks work in curious ways and, in what follows, I suggest Knight's influence on Simon was formative, though backhanded, constraining rather than inspiring. Aware or not, much of Simon's thinking was in reaction to Knight's. Knight was a pluralist, favoring contrasting ways of thinking to explore each's limits (Hands, 1997; Knight, 1924). He avoided taking fixed positions and sustained a flexibility that enabled him to prioritize the immediacies of practice and ethics over logical reasoning alone. His notion of uncertainty drew in ethics. In contrast, Simon, bent on 'hardening' the social sciences, always took positions, presuming 'ontological closure' and searching for rigorous conclusions (Petracca, 2022, p. 103; Spender, 2013). Over the course of Simon's career, these contrasts led him to move away from his first field, public administration, into organization theory and behaviorism, and thence into psychology, computing and artificial intelligence. But at the end of his life, ruminating on the future of bounded rationality, Simon seemed to come full circle and reflect more Knightian views (Simon, 2000a, 2001).

When RUP was published in 1921, Knight was at the University of Iowa, having finished his PhD at Cornell University in 1918. While at Iowa, he published a handful of discipline-shaping papers that alone would have sufficed to change American economics and establish his reputation (Emmett, 2009; Emmett and Biddle, 2011). Although he had been an adjunct earlier, he joined the Chicago economics faculty in 1924. Knight's Iowa papers were mutually illuminating, but especially pertinent was his 1924 paper "The limitations of scientific method in economics" (Emmett, 1999b, p. x; Knight, 1997b). He believed some aspects of real-world economic behavior lay beyond the reach of rigorous science and hence any 'science of economics' would be 'bounded'. Conversely, ignoring these extra-scientific aspects would characterize economics as a socially irrelevant intellectual game. A second paper, "Fact & metaphysics in economic psychology", explored notions of the individual's changeability, what Simon would later call docility (AB, p. 85; Knight, 1925; McMillan, 2016). And in "Business management: Science or art?" Knight viewed economic activity as a creative art form, echoing Alfred Marshall's 'ordinary business of life' (Knight, 1923; Pattit et al., in press). Note, Knight's own description of his PhD was a "fuller and more careful examination of the role of the entrepreneur" (Knight, 2006, p. xi).

The Iowa papers also revealed Knight's methodological pluralism, reflecting that of Max Weber. Knight, proficient in French and German – as was Simon (Simon, 2019) – was the first to translate any of Weber's works into English (Weber, 1961). Knight's pluralism led him to see social science research as multi-method, each method a limited tool. Analysts needed several if they were to grasp the open-ended nature and tensions of real-world economics (Hands, 1997). Here, Knight echoed but did not cite Neville Keynes's The Scope and Method of Political Economy (Keynes, 2011). In this book, Keynes proposed a triad of incommensurate

methods to grasp real-world economics: mathematical rigor, historical knowledge of the political economy being examined, and an appreciation of the entrepreneurship of the individuals involved. Keynes wrote Scope & Method at the urging of Alfred Marshall, his Cambridge colleague and mentor, who feared disputes over method could damage English-language economics as fatally as the Methodenstreit had damaged German economics (Moore, 2003). Pertinently, given Knight's epistemological flexibility, he wrote much about the distinction between fact and value, the theme Simon made central to his PhD thesis (RUP, p. 63; Knight, 1942). Equally pertinently, Friedman began his influential "The methodology of positivist economics" by trashing Keynes's book, arguing that mathematical rigor alone made for a science and that prediction was what really mattered (Friedman, 1953).

In my PhD, I considered RUP fleetingly because my whole project was about managerial judgment as the response to uncertainty, although I had little idea of what Knight really meant by that. Nonetheless, getting beyond the trivial notions of risk as probabilistic data and uncertainty as the lack of data, I proposed managerial judgment as the entrepreneurial response to a plurality of uncertainties: ignorance, indeterminacy, incommensurability and irrelevance (Spender, 1989, p. 43; 2014, p. 10). Entrepreneurs had to manage each of these and their interplay. Borrowing from Alfred Schutz, I hypothesized industries evolved shared 'industry recipes' to help them do this (Schutz, 1972; Spender, 1989).

Later, I sensed Knight's influence on Simon had been greater than Simon himself appreciated or conceded (Pattit et al., in review). Eventually, I saw Knight's work as a pluralistic language island bounded by three assumptions: the unknown-ness of our future, the presumption of universals that could be known (the basis of a true science) and the imaginative and ethical processes of negotiating this complex social space. Knight's anti-positivism was a denial that all relevant universals arose from nature's invariant properties. Rather, those of the social sciences arose from the institutional truths and values society generated and inhabited (Asso and Fiorito, 2008). Likewise, the island's historical context mattered. Crucial, but under-stressed in Knight's writing, was that the island became colonized and institutionalized as an operational language. All our knowledge is limited by the specific languages in which we make truth claims, be that mathematics, statistics or some 'natural' language. Knight regarded language as the most fundamental of social institutions, for it alone enabled social interaction, reflection, and reasoning (Knight, 1997a, p. 75). As with Keynes's Scope & Method, Knight's (1924) "Limitations" paper showed the 'language of science' was meaningful only when complemented by other languages that would appear in the analysis as 'auxiliary hypotheses'. There could be no one-best universal language.

HERBERT SIMON

While not understanding much about Simon's work either, I made it central to my PhD. Years later, I studied his work for a short intellectual biography (Spender, 2013). That essay, shaped by Crowther-Heyck's biography (BRA, 2005) as well as by Simon's own (MML, 1991), did not explore Simon's intellectual sources and influences. Along with many who write about him, I thought it unnecessary to peer behind his own statements (Simon, 1991; Kerr, 2007; Simon, 1997b). But like all autobiographies, MML was highly crafted, and downplayed aspects of Simon's career. Plus, his sources were broader than those mentioned in MML. He had won a competitive scholarship to Chicago in mathematics, physics and English. Crowther-Heyck reported him to be a talented mathematician, and Simon claimed writing was easy, though mathematics was

his preferred medium for thinking. Later, Simon learned that while he saw mathematics as a "language of discovery", others, such as his Cowles colleagues – especially the 1975 Nobel awardee Tjalling Koopmans – regarded it differently, as a "language of proof" (Simon, 1991, p. 106; Simon, 1978). The distinction echoed an earlier dispute between Locke and Leibnitz about the nature of mathematics.

When Simon began his studies, he was no stranger to economics. A precocious schoolboy, his enthusiasm for mathematics and science was balanced by studies of French, German and music along with other subjects. He also boxed and debated the social and political issues of the day. He read into the library of his uncle, Harold Merkel, who had studied institutional economics under John R. Commons (Crowther-Heyck, 2005, p. 16; Simon 1997b, p. 191). So he knew that many economists, especially the 'old institutionalists', accused their modern marginalist colleagues of being in thrall to perfect rationality (Hodgson, 1989). At the same time, those adopting historical and interpretive methods were heavily criticized for their inattention to rigorous theory.

Signing into Chicago's political science department was no second-best decision, for Charles Merriam was hugely influential in US politics. Simon quickly became known in the public administration community. The arc of his career, from public administration through to administrative theory and psychology, bounded rationality, computing, modeling and heuristics began with the problems of the public sector rather than those of business or economics. Simon saw these as rooted in conflicts between the participants' interests and values. For an undergraduate class taught by Jerome Kerwin, Simon wrote a paper on how the Milwaukee City government went about allocating scarce funds between equally politic aims. He had an epiphany as he realized choices of 'value' determined the meaning of the 'facts' brought to bear. Realizing that "reason, then, goes to work only after it has been supplied with a suitable set of inputs, or premises", Simon insisted that premises were the fundamental units of analysis rather than the decision (Simon, 1976, p. xii; Simon, 1983b, p. 7). The paper attracted the attention of another faculty member, Charles Ridley, and together they wrote a handbook on municipal administration that quickly became known nationwide (Ridley and Simon, 1936).

Other than the Political Science Department's faculty, Simon named three intellectual influences: Henry Schultz, Rudolf Carnap and Nicholas Rashevsky (MML, p. 51). From Schultz (and Henry Simons), Simon learned the power of mathematics in the social sciences. From Carnap, he learned something about logical positivism and the philosophy of science. From Rashevsky, he learned about biological systems, their thermodynamics and how the concept of entropy might be applied. There was also the broader intellectual background, the context that many label the Chicago School (Chamberlin, 1957; Gramm, 1975). In 1933, the University of Chicago was the nation's leading institution for social, political, and economic studies. Plus, there was a Chicago school of sociology before there was one of economics, whose antecedents went back to Europe as well (Emmett, 2009). But a promising place to pick up the Knight/Simon story is with Thorstein Veblen and his "Why is economics not an evolutionary science?" (Veblen, 1898). Veblen's influence was pervasive in Chicago (Hodgson, 1998). The core of his 1898 paper was a distinction between positivist and evolutionary methods. The first focused on causes and facts, the second on individuals' values and how these might change through time.

Veblen imagined external studies of economic activity in markets complemented by internal studies of the economic actors' interests and values. Knight was critical, even dismissive, of Veblen's work but he took a similar line in his own thesis. Loosely speaking, RUP's Parts I

and II explored a rigorous economics of facts, while Part III explored a contrasting discourse of values (Pattit et al., in review). Parts I and II explored generalities, using graphs; Part III presumed particulars, using non-mathematical language. The contrast of generalities and particulars is found in Aristotle and Knight's pre-Cornell studies included philosophy. While RUP's Parts I and II presaged Chicago's neoliberal theorizing; Part III reflected Knight's institutionalism and how the individual's judgments and values entered the analysis when the situation was judged underdetermined by 'the facts'. Social institutions are islands of shared values and their associated language. Knight's view was that economists should study existing economic institutions to assess the degree to which they enabled 'free' individuals to discover and evolve their own values, bringing to the surface higher values as lesser ones were satisfied (Knight, 2013). Aligned with Weber, Knight reflected his view that in the post-feudal age, markets were the crucial democratic capitalist institutions that created and protected citizens' new freedoms. Economic activity was the practice of democratic freedom, the realization of an identity in the economic sphere of life.

Veblen arrived at Chicago in 1892, moving on to Stanford in 1906 (Coats, 1963). Knight certainly knew Veblen's work well, taking part in a series of workshops on Veblen at Chicago while still at Iowa. Even as Knight was sharply critical, Veblen's critique of the use of scientific methods in economics influenced many Chicago colleagues and students, especially Wesley Mitchell, author of "The rationality of economic activity" and "Human behavior and economics" (Mitchell, 1910a, 1910b, 1914). Knight was familiar with Mitchell's ideas, twice cited in RUP on the behavioral nature of choice, although not in "Limitations" (Knight, 2006 [1921], p. 64n2; 1924). Milton Friedman also found Mitchell's work especially influential (Friedman, 1950). Mitchell saw how institutionalist ideas and methods went beyond perfect rationality to construct social or collective entities, social spheres of meaning-making and reasoned practice. As Douglass North later wrote, the institutionalization process was collaborative as politically and economically free individuals created a discourse that enabled them to debate, reason and act mindfully on the uncertainties of their situation (North, 1991).

In the 1920s, Chicago's 'old' institutionalist traditions were upended as logical positivism arrived from Vienna. The resulting anti-institutionalism was lavishly funded by business interests such as the Cowles, Volker and Walgreen Foundations as they promoted 'scientific rigor' at the expense of social and political relevance (Phillips-Fein, 2009). By the 1930s, non-positivist social science methods were pushed out of fashion and researchers were challenged to 'harden' their studies. Following the trend and aligning with Carnap and Schultz, Simon declared himself a "logical positivist" (1991, p. 44). The leading English language text was Alfred Ayer's Language, Truth and Logic (Ayer, 1971), which Simon cited (1958a, p. 45n1, n2). Ayer considered verification as the font of logical positivism. Meaningful statements were empirically testable; other statements, such as those about values, were without scientific (real) meaning. But Simon later recognized that declaring himself a logical positivist might have misdirected his readers. Softening his earlier 'stubborn' logical positivism, he re-classified himself as a "logical empiricist", emphasizing attention to doings in the world rather than only to abstract models and their presuppositions (MML, pp. 44, 85).

Beginning with AB's Preface, Simon pointed to the lack of adequate language with which 'to capture the real flesh and bones of an organization' (Simon, 1958a, p. xlv). In his view, this lack was a

serious indictment of the social sciences. He saw AB as an attempt to correct this deficiency (Simon, 1958a, p. xlvii). Thus, AB can be regarded as Simon's project to create a new academic language about organizations, institutionally contingent rather than universal or axiomatic. Simon circulated a very different and more abstract first draft to many. Among those responding was Chester Barnard, a non-academic autodidact much influenced by Vilfredo Pareto, whose new Functions of the Executive (1951) had impressed Simon deeply. Barnard responded with 11 pages of commentary. Simon reconstrued his thesis, and Barnard's contrast of rational versus non-rational aspects came front and center; henceforth, Simon saw the necessity that administration must focus on managing the non-rational elements (AB, p. 39). Barnard became the principal influence on Simon's thesis (O'Connor, 2011) and also wrote the Foreword to AB. Acknowledging his intellectual debts, Simon borrowed many of Barnard's concepts: authority, zone of acceptance, organizational identification, and even a whiff of bounded rationality (Simon, 1991, pp. 86–87; Simon, 1976, p. xx).

CALIFORNIA, THE ORAL AND PREPARING AB

The success of Simon's public administration work with Ridley led to an invitation from the influential Berkeley political scientist Samuel Chester May to visit and work on a California Bureau of Public Administration project. Simon also prepared for his PhD preliminary exams. These completed, Simon began work on his thesis in 1941. By May 1942, his revised draft had been accepted and he returned to Chicago for his oral examination (Simon, 1943). Both the final thesis version and AB had four footnotes to Knight (pp. 74n9, 250n2, 251n3, 252n4). The book differed from the thesis in chapter order but little else. Both had the same Appendix, though AB lacked the PhD's second mathematical Appendix. For all that, AB showed no evidence that Simon had been influenced by the Knight works he cited, so their presence was a puzzle. Simon's footnotes were equally cursory in the pre-publication drafts.1 He obviously felt his research agenda was adequately presented in "Decision making and administrative organizations" (Simon, 1944, p. 29). Citing Barnard again, he listed authority, identification, efficiency, information and training as his key concepts. But the paper was far from a trial run at AB – and there may have been more to it.

According to Simon (1991, p. 84), the sharpest critic on his PhD committee was Charner Marquis Perry. Perry was a philosopher who eventually headed Chicago's Philosophy Department and edited Chicago's International Journal of Ethics from 1934 to 1967 (renamed Ethics: An International Journal of Social, Political, and Legal Philosophy in 1938). Under Perry's editorship, the journal became a major outlet for Knight as he transitioned from mainstream economics to social philosophy and the ethics of economics, a shift anticipated in RUP's final chapters (Emmett, 2021). Knight published regularly in Ethics from 1929 to 1953 (Emmett, 1999a). In the spring of 1940, shortly before Simon returned to Chicago for his oral exam, Knight delivered two lectures sponsored by the Walgreen Foundation. Perry edited these into his Philosophy of American Democracy (Knight, 1943a, 1943b; Perry, 1943). He had also published Knight's review of Bertrand Russell's book on power, which Simon may have read at Perry's suggestion (Simon, 1958a, p. 250n2; Knight, 1939). Simon also cited Perry in AB (1958a, p. 130n8).

Perry, thoroughly familiar with Knight's anti-positivism, may have found Simon's logical positivism and fact/value distinction wanting (Fiorito, 2016; Hammond, 1991). We can speculate that AB's Appendix was Simon's post-oral response to Perry and the other committee members, pushing it over the finish line. Many had read and commented on earlier

drafts (Simon, 1958a, p. xlix). Simon noted that two other examiners, Jerry Kerwin, for whom he had written his formative undergraduate paper, and Herman Finer, also had trouble with his "stubborn positivism" (1991, p. 85). In the Russell review, Knight wrote pointedly: "it is not merely impossible to defend, it is impossible consistently to adhere to any clear or sharp distinction between facts and values, or the truth of judgments about the two types of predicate" (Knight, 1939, p. 266). Simon's footnotes to RUP and 'outguessing' being RUP's essence suggested he had not really studied the Knight works he cited (1958a, p. 252n4).

Simon hoped AB would shift the analytic focus from decision making to choosing premises. This would extend beyond reasoning, rationally drawing conclusions from data, to selecting – a-rationally – the premises that framed the data and gave them meaning (Simon, 1958a, p. xii). "It is therefore the premise (and a large number of these are combined in every decision) rather than the whole decision that serves as the smallest unit of analysis" (Simon, 1958a, p. xii). The reader was cautioned that value referred to 'ought's' while facts referred to 'is's', so the two were incommensurate (Simon, 1958a, p. 5). AB's Chapter II was a frontal attack on the existing public administration literature and on 'proverbs' such as the 'span of control', because they only provided language for describing organizations, failing to theorize or explain them, and because the proverb language was ultimately incoherent, often contradictory (Simon, 1958a, p. 36).

Many reading AB miss Simon's claim that it proposed a new language, specifically a vocabulary more analytically powerful than that generated from the proverbs (1958a, p. xlvii). Chapter II continued: "Before a science can develop principles, it must possess concepts" (Simon, 1958a, p. 37). Every language begins with or 'stands on' concepts/axioms, things taken for granted and beyond doubt rather than justified or proven. Simon parodied the public administration literature's fondness for concepts such as authority, centralization, span of control, and function without seeking operational definitions or inter-concept relations (Simon, 1958a, p. 38). His own Barnard-inflected vocabulary (and career-long monomania) would stand on the mentality of individuals and their ability to construct, process and enact correct decisions.

Today Simon's concepts seem boringly familiar but some of the nuances may have become obscured. He stressed two individuals with the same skills, objectives, values and knowledge (premises) would 'rationally' decide on the same course of action; thus, administrative theory should be less concerned with differences between individuals' ability to reason than with the organizational factors which determined the premises they adopted (1958a, p. 39). AB's Chapter III suggests the sources of Simon's new language were Carnap's logical positivism and notion of falsification, itself based on the triad of an Aristotelian syllogism: hypothesis A is exposed to test B, leading to an empirical conclusion C. The test language B must be incommensurable with theory language A if the conclusion C is to be empirically meaningful rather than merely tautological. Simon did not note Knight's extended discussion of syllogisms in "Limitations", which he may not have read (Knight, 1997b, Section II). Despite Simon's claim to be a logical positivist, his language broke epistemologically with the naïve positivism of a single coherent language of science that would cover all real phenomena and thereby reveal the unity of reality. On the contrary, science required a vast inventory of incommensurable languages, each applicable to a specific category of phenomena.

ILLINOIS INSTITUTE OF TECHNOLOGY AND THE FOUNDATIONS

In 1942, finishing up his PhD and being excused from military service, Simon secured a post at the Illinois Institute of Technology (IIT), also

located in Chicago (1991, p. 93). Despite a heavy teaching load, he took on additional work with the City Managers' Association. In 1945, Bill Cooper, an older student friend, introduced Simon to colleagues at the Cowles Foundation (Simon, 1991, p. 101; Chirat et al., 2022). The work Simon did there was decisive in shifting his intellectual trajectory. Whereas Barnard's pluralism had drawn Simon away from rigorous modeling to the post-proverb language of AB, Cowles brought him back to "translate mathematically part of his previous research" (Chirat et al., 2022, p. 1; Simon, 1950). Model became Simon's new signature metaphor.

After becoming full professor in 1949 and completing Public Administration (Simon, Smithburg, and Thompson, 1950), an extended post-proverb language version of AB, Simon was tempted away from IIT to the fledging business school being founded by Lee Bach (Simon et al., 1950). The Bach, Cooper and Simon troika – all University of Chicago students – became GSIA's co-founders (Simon, 1991, p. 143). Simon was to bring rigor to administrative theory and practice, precisely the Cowles Foundation's agenda. Contact with Cowles led to further consulting and a year's secondment at RAND (Simon, 1991, p. 131). This move reinforced Simon's turn towards modeling, but, equally important, he met Allen Newell with whom (together with Cliff Shaw) he 'invented' LISP, a list processing language (Simon, 1991, pp. 168, 189, 199; Petracca, 2022). In 1952, discussions with RAND colleagues led to a rigorous "model of rational choice by organisms of limited computational capability", as laid out in a 1953 draft (Simon, 1953, 1955b). The Ford Foundation also funded GSIA's exploration of behavioral theories of the firm (Simon, 1991, p. 163). A version of Simon's RAND paper, acknowledging Cowles, ONR and Ford support, appeared as "A behavioral model of rational choice" (Simon, 1955a). Next, acknowledging Ford Foundation support and numerous conversations with Newell, came "rational choice and the structure of the environment", wherein Simon introduced satisficing (Simon, 1956, p. 129). Simon wrote that 1955 and 1956 were the most important years of his life as a scientist (1991, p. 189). But returning to his earlier interest in computing (Simon, 1991, p. 70), his attention turned away from the broad issues of political science and economics to the specifics of psychology and computation, to the "symbolic processes people use in thinking" (Simon, 1991, p. 189). Modeling became simulation, 'ontologically closed' (Petracca, 2022).

Satisficing and bounded rationality pushed against the orthodoxies in several disciplines (Cristofaro, 2017). Naïve positivist-based interpretations simply conflate satisficing with bounded rationality, arguing true knowledge of reality is possible and that 'bounded rationality' leads to an approximation which is workable but imprecise because of the cognitive limitation. The 'model of man' implied is of an intendedly rational but imperfectly computing entity. Simon inadvertently reinforced this unworkable one-dimensionality when he wrote: "people satisfice because they do not have the wit to maximize" (Simon 1958b, p. 62). Not only did this fail to deny the naïve view but, more importantly, it is a negative definition, standing on the presumption that total or perfect knowledge is achievable, at least in principle.

Much of the subsequent debate about bounded rationality remains inconclusive because, while all agree the notion seems distinct from perfect rationality, a new language or epistemology of imperfect knowledge was (and is still) needed. For instance, Reva Brown suggested with bounded rationality Simon was (1) moving beyond logical positivism, (2) synthesizing positivist language with, perhaps, Barnardian language and (3) revisiting epistemological debates about the limitations of positivist science (Brown, 2004). She did not cite Knight. Equally, one of Knight's most trenchant criticisms of positivism was of its inherently

static or equilibrium nature; 'real' change is erased (Knight, 2006 [1921], p. 37). Generally speaking, Knightian uncertainty is about the kernel of doubt in all knowing. When considering time, Knightian uncertainty addresses the impossibility of foretelling the future, itself standing on Knight's notions of time and change that may have reflected his reading of Bergson's work (Knight, 2006 [1921], pp. 16, 208; 1997a, p. 89; Bergson, 1992; Knight, 1997a, p. 89). Simon, in contrast, brought his analysis into a dynamic framework by stressing 'procedural' rationality over 'substantive' rationality (Simon, 2000a). But his dynamism was tentative: his mazes had to be run, not simply designed. The implication was that rationality leads to adaptation, a striving towards perfection, as agents learned from experience.

Expanding on Simon's ideas, Peter Todd and Gerd Gigerenzer argued for two 'bounds' to rationality, one, the extent to which reality is known, and the second, the extent to which such knowledge can be processed or reasoned. The two constraints, external and internal, like the contrast of etic and emic, comprise a 'scissors' that enables a triad of mutually exclusive modes of knowing: optimization under constraint, cognitive illusion and ecological rationality (Todd and Gigerenzer, 2003, p. 145). Simon made much use of the scissors metaphor (Petracca, this volume). Potts suggested Simon's scissors separated agent and context. fostering a dynamic epistemology relating a knowable reality, a bounded model reflecting the agent's purposes and the agent's capacity for generating and learning new practice-relevant language (Potts, 2000, p. 113).

MEANWHILE, IN PUBLIC ADMINISTRATION

Working on the Cowles and RAND agendas, Simon moved away from public administration and pushed into heuristics, beginning to model bounded rationality and develop his 'science of the artificial' – and head towards his 1978 Nobel Prize in Economics. But ex-colleagues in public administration were now responding to his work in ways that reflected their familiarity with Knight's ideas. Simon was miffed that none of those reviewing AB in 1947 recognized its 'revolutionary' nature (1991, p. 88). Crowther-Heyck noted that AB did not make much of a splash when it appeared, and thus, its rise to prominence in the early 1950s is "a curious story, for its acceptance was due as much to its critics as to those who sang its praises" (BRA, p. 134). He noted the criticism made in 1952 by Dwight Waldo, then the US's leading public administration academic. Without question, Simon's legacy in the public administration field was shaped less by AB, Public Administration, and his other public administration publications than by his fight with Waldo in the pages of the American Public Science Review (Frederickson, 2001). Given the impact it is curious that Simon did not mention Waldo in MML.

The fight began casually enough. Waldo had written "Development of theory of democratic administration" in celebration of Francis Coker's retirement from the Political Science Department at Yale (Waldo, 1952). Waldo opened with a discussion of democracy, and how the scientific management of Frederick W. Taylor had led private administration theorizing towards cold scientific self-calculation and condescension towards the employees – very undemocratic. But Waldo also noted that since Taylor's time there had been a change for the better, from 'harsh paternalism' to 'benevolent paternalism', though the outcome was still far from democratic. Following Woodrow Wilson's "Study of administration" and Frank Goodnow's Politics and Administration, it became axiomatic to distinguish politics from administration (Goodnow, 1900; W. Wilson, 1887). The maxim was "autocracy during hours is the price of democracy after hours" (Waldo, 1952, p. 87). Coker resisted this, closing the gap between politics and administration, especially in the pages of the

Public Administration Review, and rejecting 'efficiency' as administration's proper goal.

Thus, Waldo's paper identified AB as a closely reasoned defense of a science of administration centered on 'efficiency' just as the field was moving to de-emphasize, even reject, the concept. Earlier, Coker had published "Dogmas of Administrative Reform" in American Political Science Review (APSR), anticipating Simon's "Proverbs of Administration" (Coker, 1922; Simon, 1946). Noting also the work of Mary Parker Follett, Waldo took a gratuitous swipe at AB and Simon's fact/value distinction (Waldo, 1952, p. 97n40; Follett, 1998). He concluded: "the central problem of democratic administration theory … is how to reconcile the desire for democracy (freedom is too narrow a concept) with the demands of authority" and "the only thing which can legitimize authority in a democratic society is democracy itself" (Waldo, 1952, p. 103). Waldo, we can presume, arranged for responses from Simon and Peter Drucker to appear in the following issue of APSR. In Simon's response, he charged Waldo with not understanding positivist thought, the fact/value distinction or how scientific language worked. In a concluding flourish, Simon wrote:

I do not see how we can progress in political philosophy if we continue to think and write in the loose, literary, metaphorical style that (Waldo) and most other political theorists adopt. The standard of unrigor that is tolerated in political theory would not receive a passing grade in the elementary course in logic, Aristotelian or symbolic. (Simon et al., 1952, p. 496)

Waldo was not the only scholar who suggested that Simon's project to use 'science' to harden public administration was not going well, only in part because his notion of science was not shared. In 1950, Simon's long-time critic Charner Perry published "The semantics of political science", a lengthy discussion of the nature of science and language. Simon, Max Radin (professor of law at Berkeley), George A. Lundberg (professor of sociology at University of Washington) and Harold Lasswell (in Merriam's department) were invited to respond in the same issue (Perry, 1950; Simon, Radin, et al., 1950).

Perry echoed Knight's notion of 'commonsense' as the foundation of society (Knight, 1997a, p. 111). Specifically, civilization arises from the functioning of the body of commonsense language that realizes and animates the social institutions which hold that civilization together (Perry, 1950, p. 396). The language underpins and bounds that civilization's universe of meaningful statements. Perry noted that the study of commonsense, although it has progressed somewhat, is still not regarded as a science. The language of science deals with the natural order's invariants and therefore stands apart from the language of social phenomena and its changing subject matter. Perry wrote:

As Veblen's remarks suggest, the desired transformation of the study of man into a science involves much more than the superficial application of scientific method to a given subjectmatter. It involves a transformation of the subjectmatter, a substitution of one point of view and set of terms for another. (Perry, 1950, p. 398) He added:

Social knowledge has indeed been greatly extended and improved in the last two hundred years; but as far as I know there have been no important contributions in the field resulting from the application of the scientific method. The zeal for science has probably been quite important as a motivating force but as a guide to investigation it has been almost, if not completely, sterile. (Perry, 1950, p. 398)

Simon accepted the problems of observing while being part of the social system being observed but concluded commonsense cannot be expressed in the language of science. Rather, science must treat commonsense as part

of the data to be analyzed (Simon, Radin, et al., 1950, p. 408). Now Simon's enquiring Martian appeared for the first time, anticipating its later appearance in his "Organizations and markets" and Mattioli Lectures (Simon, 1991; Simon, 1997c). Simon conceded Perry's 'intertwining' of language and institutions but took exception to the implication that it gave them an 'artificial' or 'constructed' nature. From his perspective, political science had been hobbled by inheriting the methods of history, law and ethics, and needed to embrace the new scientific methods and language of psychology (Simon, Radin, et al., 1950, p. 411). Rather than go with the discipline's trend and conflate administration with politics, as Perry and Waldo suggested, Simon doubled down in "Comments on the theory of organizations", conflating public organizations with private ones, equally scientifically analyzable. In the paper he developed appropriate 'propositions,' listing six major research areas and rephrasing the problematics of AB, and concluding that organization was more Zweckrational than Wertrational (Simon, 1952, p. 1139).

In 1957, a second (revised) edition of AB appeared. Edward Banfield, another major Chicago political scientist, reviewed it in Public Administration Review. Elsewhere, Banfield reported many of his best ideas came from Knight (J. Q. Wilson, 2002, p. 42). Banfield's review took exception to Simon's positivism and that, lacking controlled experimental conditions, one had to rely on commonsense (Banfield, 1957, p. 280). He homed in on Simon's concept of efficiency; "the nuclear concept around which others are organized and which gives them relevance and systematic character" (Banfield, 1957, p. 283). He saw the second edition's satisficing as eroding the first edition's practical maximizing which remained the better book (Banfield, 1957, p. 285). In passing, he also noted that premise, so central to Simon's arguments, did not appear in the index of either edition.

Simon hit back with "The decision-making schema: A reply", charging that Banfield was "defending proverbs and wisdom against the austerities and pretentions of the scientific method" (Simon, 1958b, p. 60). Regarding his shift from maximizing to satisficing, Simon conceded Banfield's point but claimed it was a distinction without a difference, as satisficing was implicit all along. But he added an interesting remark about organizational goals.

> What Mr. Banfield means is that the change, like his recognition that there may be multiple and incommensurable goals in organizations, adds one further link to the process of going from a 'pure' or 'sociological' science of administration to policy recommendations in the applied science of administration. Under favorable circumstances, a criterion of maximizing guarantees that there will be a single, uniquely determined 'best' course of action; the criterion of satisficing provides no such guarantee. My argument is that men satisfice because they have not the wits to maximize. (Simon, 1958b, p. 62)

Simon fleshed this out in "On the concept of organizational goal", claiming his treatment was consistent with his GSIA colleagues Richard Cyert and Jim March's A Behavioral Theory of the Firm (Cyert and March, 1963; Simon, 1964, n2). Reiterating AB's fact/value distinction, Simon wrote: "By goals we shall mean value premises that can serve as inputs to decisions. By motives we mean the causes … that lead individuals to select some goals rather than others as premises for their decisions." (Simon, 1964, p. 3). Then

> we do not have to postulate conflict in personal goals or motivations in order explain such conflicts or discrepancies … [which] arise out of the cognitive inability of the decision makers to deal with the entire problem as a set of simultaneous relations, each to be treated symmetrically with the others. (Simon, 1964, p. 17)

He presumed that the organizational goals determined the senior executives' roles (Simon, 1964, p. 21). In AB, he wrote: 'In public administration final responsibility for establishing objectives rests with a legislative body; in private management with the board of directors, and ultimately with the stockholders.' (1958a, p. 52). Note that Cyert was already at GSIA when Simon arrived in 1949. In his encomium on Simon's 1978 Nobel Memorial Prize, Cyert reported that Knight helped Simon grasp the "meaning of rigor in economics" (Cyert, 1979, p. 63).

The new AB was also lambasted by Herbert J. Storing, yet another influential Chicago political scientist. In an 86-page critique of Simon's hardening efforts, Storing, referencing his colleague Perry, concluded:

Simon correctly points out the inadequacy of merely commonsensical understanding of administration and human behavior; but the result of his strenuous activities has been to leave the water a good deal muddier than it was before ... He attempts to make an entirely new language that, because it is scientific, will be free of the defects of commonsense. The attempt fails. (Storing, 1962, p. 150)

Simon was so exasperated by Storing's "egregious examples of the practice of reading texts unsympathetically and without a genuine attempt to understand them that I never felt an urge to respond to them" (Simon, 1991, p. 63).

PROBLEMS AT GSIA

The preceding account shows scholarship as a competitive, sometimes brutal game, and Simon as a skillful and aggressive player. But it also shows that from Simon's PhD studies onwards, he positioned himself at the boundary between administration theory's warring languages. As he became increasingly committed to his 'hardening' project, bringing positivism to public administration, he became increasingly distant from the rest of his first community. He doubled down on formal modeling just as the field was softening its language under the influence of Knight and Waldo, who were re-embracing the languages of politics and ethics. Meanwhile, GSIA was growing and Simon's relations with its rigor-focused faculty became increasingly strained. The neoliberal economists, especially, did not welcome Simon's persistent sniping at their 'absurd' assumptions of rationality and omniscience. As early as 1951 his old friend Bill Cooper had to take Simon to 'the woodshed' to straighten things out (Simon, 1991, pp. 143–147). Simon knew that 'one can't beat something with nothing' and, quoting Lavoisier, that he needed another new language to set against the neoliberal economics language being developed (Simon, 1958a, p. xxxiii; 1997a, p. 173). Criticizing others' assumptions achieved little, especially given Friedman's insistence that predictive accuracy, not assumptions, was what mattered.

Computer language offered Simon an entirely new strategy. His "Theories of decision-making in economics and behavioral science" explored alternative administrative languages. Crucially, he concluded "the notion of decision premise can be translated into computer terminology … [to] provide us with an instrument for simulating human decision processes" (Petracca, 2022; Simon, 1959, p. 274). In retrospect, Newell and Simon's contribution seemed simple enough, but its gestation was long and arduous. Simon described it as "climbing the mountain" (1991, p. 198). At the 1952 RAND summer seminar, Simon and Newell had pondered programming instructions for playing chess (Simon, 1991, p. 201). During the 1952 Christmas break, the pair took a major step towards programming their Logic Theorist (LT) to discover proofs for theorems in symbolic logic. Simon labeled its search routines heuristics (Simon, 1995). They comprised computable rules (reasoning), 'islands' of code-language based

on premises that bounded a 'possibility' or search area. Simon wrote Bertrand Russell that LT could prove elements of his Principia Mathematica (Whitehead and Russell, 1963). Russell was delighted, saying: "if only he and Whitehead had known, what work it would have saved!" (Simon, 1991, p. 207). Simon recognized that he, Newell and Shaw were standing at the edge of a vast new territory made visible by their new language. He pushed forward against others' ignorance rather than entrenched defenses (Simon, 1991, p. 217).

Newell and Simon shared their novel 'list processing' techniques at the 1956 Dartmouth AI conference, whence it propagated rapidly (Simon, 1991, p. 210). But by the spring of 1957, Simon's team realized it needed a new research strategy. Their objective was to simulate human problem solving, not simply to show off LT's capabilities. A heuristic captured a specific human's premise choices and reasoning, not those of the machine. Over the summer of 1957, the team uncovered individuals' practice through think-aloud protocols which were then programed into the General Problem Solver (GPS) (Ehrig et al., 2021; Greeno and Simon, 1988). As these advanced, more of the new AI territory became mappable, soon to be claimed and tilled at a vast profit by the exploding new industry that created a digital universe.

Meanwhile, Simon's moves to reduce GSIA's institutional tensions led to his "The business school: A problem in organizational design" (Khurana and Spender, 2012; Simon, 1967). Ironically, Simon found the 'rational expectations' language emerging at GSIA less and less congenial. Cowles had also jumped ship from Chicago to Yale and "under the influence of Friedman became completely intolerant of alternative religions" (Simon, 1991, p. 250n). Seeing heuristics' relations with psychology as stronger than those with economics, Simon began to 'retreat' from GSIA and advance to a new base in Carnegie-Mellon University's psychology department. He set out to re-engineer his earlier behaviorism and re-formulate his cognitive psychologizing in terms of heuristics (Hosseini, 2003) – and with great success! The psychology department flourished and did much to secure Carnegie-Mellon's global reputation (Andresen, 2001; Feigenbaum, 1989; Klahr and Kotovsky, 1989; Leahey, 2003; Sent, 2004). In 1969, Simon confidently summarized his new language in The Sciences of the Artificial, dedicated to Allen Newell (Simon, 1996).

But there was new strife. In 1965, Hubert Dreyfus's internal draft Alchemy and AI shocked the RAND community. Dreyfus, a scholar of the continental philosophers Husserl and Heidegger, had been hired to evaluate Newell and Simon's work (Wrathall and Malpas, 2000, p. 2). The contract arose through Hubert's brother Stuart, a major contributor to RAND's dynamic programming research. Dreyfus's draft was expanded into the popular What Computers Can't Do: A Critique of Artificial Reason (Dreyfus, 1972). The book provided yet another language, this time to fuel the furor over AI's limits and potential that continues to rage today as AI extends its impact on our lives. The essence of Dreyfus's critique was that the knowledge relevant to reasoning about human activity reflected the world humans create and inhabit; it was not machine-made, abstract or 'given from on high'. Dreyfus might have cited "Limitations" (Knight, 1924) and its arguments, for Knight shared much with Dreyfus's philosophizing. Instead, Dreyfus argued that while computers do not inhabit our world, they are readily available tools for our use. They do their thing and we do ours, separate universes of 'knowing' and 'doing' (Collins, 1996; Spender, 2015). But Simon was irrepressible, less concerned about what computers could not do than about what they could do – more and more so as computing costs fell and programs figured out new applications. Dreyfus sketched some boundaries and principal areas of AI potential: game playing (especially chess),

problem-solving (theory proving), language translation and pattern recognition (Dreyfus, 1965, p. 9).

Dreyfus's principal alarm was over Simon's exuberance. Dreyfus also saw that the AI field's difficulties revealed basic misunderstandings about what could be said and in which language. An obvious limitation being that computers had only one type or mode of intelligence (binary) while human beings had several, including that of computer-like reasoning. Although humans' reasoning capacity may be limited, Dreyfus presumed we have other imaginative capabilities that computers do not possess. He pointed to the differences between human and computer languages, and hence the many meanings of intelligence, and to the different limits implied: "Machines are perfect Cartesians, human beings are anything but" (Dreyfus, 1965, p. 66). Specifically, computers cannot deal with an infinity of facts, an indeterminacy of needs, nor with the reciprocity of context and activity and the resulting threat of circularity – inabilities that amount to working definitions of Knightian uncertainty (Collins, 1996). Given his contract's brief, Dreyfus pointed to the problem areas that seemed open to AI techniques and warned against the less promising ones (Dreyfus, 1965, p. 82). The subtext of his critique, and the source of many of our anxieties about AI, was that machines could not address the evident capacity of humans to deal creatively with Knightian uncertainty, thus they cannot inhabit the world in the way that we humans, being bounded, actively experience and inhabit it. We supplement our data and reasoning with acts of imagination, all with a pervasive sense of time's passage and our lives' futurity. Note that Knight often used the term intelligent to imply just this active attitude to life (2006 [1921], pp. 197–208).

A May/June 1973 Public Administration Review paper by Chris Argyris deployed a similar strategy, although in different language (Argyris, 1973; Lovrich, 1989). Argyris took exception to the constraints imposed by Simon's theory of organizational rationality and argued for 'self-actualization' as an alternative. He complained that Simon's theory subordinated workers to an emotion-erased and boss-driven organizational identity in an iron-cage bureaucracy. In the following issue, Simon hit back, complaining that Argyris had misunderstood almost everything about his work and that self-actualization implied an absurd notion of freedom. Rather than inveighing against constraints, Simon argued that individuals create best when they operate in an environment whose constraints are commensurate with their bounded rationality, commenting that Argyris confused his is's and ought's (Simon, 1973, p. 350). While Argyris's arguments were less than clear, he contended that Simon's theorizing was oriented towards defending the status quo, inhibiting the workers' imagination. Simon rejected this, suggesting, without offering evidence, that history showed social systems were not, in fact, inherently conservative (Simon, 1973, p. 352). He conceded that organizational theories may emphasize the processes of rational thought and decision at the expense of other processes but that "our task is to design institutions that perform their essential functions … at the same time as they satisfy important human needs of those who manage and man them" (Simon, 1973, p. 353). Argyris, no economist, could also have cited Knight on how social theorizing should clarify how a particular society's institutions might maximize their individuals' freedom.

POST-NOBEL

Simon's 1978 Nobel Memorial Prize did not incline him to hang up his boxing gloves and move into senior-statesman mode. Nor did he restrict himself to the burgeoning field of AI he had done so much to create. The field of public administration, where he started, still exerted its pull on him. In 1990, Theodore Lowi was elected president of the American

Political Science Association (APSA), Simon's initial academic community. Lowi was deeply distressed by the field's shifts since the 1930s. His presidential address outlined three subdisciplines: public opinion, public policy and public choice (Lowi, 1992, p. 2). Echoing the earlier administration versus politics debate between Simon and Waldo, Lowi observed that all three had been transformed by 'science'. The field had committed to science as an institution, to governing 'for science' and to governing 'by science', technocratizing; as a result, economics had replaced law as the operational language of the state. Lowi went on to lambast his colleagues for failing to see the political implications of this and the attendant rise of laissez-faire liberalism. He wrote:

> Traditional public administration was almost driven out of the APSA by the work of a single, diabolical mind, that of Herbert Simon. Simon transformed the field by lowering the discourse. He reduced the bureaucratic phenomenon to the smallest possible unit, the decision, and introduced rationality to tie decisions to a system – not to any system but to an economic system. (Lowi, 1992, p. 4)

Simon punched back in the Chronicle of Higher Education, the debate eventually appearing in the Journal of Public Administration Research and Theory (Lowi and Simon, 1992). He charged that Lowi understood neither how the behavioral revolution had re-shaped political science nor how it differed from economics. In short, Lowi had missed that Simon's bounded rationality acknowledged the whole person, values, emotions, stupidities, ignorance and all. Simon also complained that Lowi gave him no credit for "braving the arrows of the neoclassicists, the game theorists, and the public-choice theorists" (Lowi and Simon, 1992, p. 111). Simon noted that his earlier Madison Award talk, published in Journal of Public Administration Research and Theory, warned political scientists against the missionaries of economic rationality and public-choice theory (Simon, 1984). And, he noted: "the individual decision maker is never independent of society […] AB is at pains to point out that human rationality, even bounded rationality, is possible only in a social setting" (Lowi and Simon, 1992, p. 111). On a more mellow note, Simon welcomed Lowi as an ally – "if he was willing to join himself with the Devil" (Lowi and Simon 1992, p. 112).

In 1993, the Università Bocconi invited Simon to present his views on microeconomics. He responded with three lectures that ranged broadly over (1) rationality in decision making, (2) the role of organizations in an economy and (3) empirical evidence for economics (Simon, 1997c). He also choreographed sessions of questions and responses, a chess-master playing multiple boards. Citing Neville Keynes, Riccardo Viale (co-editor of this volume) took issue with Simon's notion of rationality. Their interchange explored the boundaries of bounded rationality. Viale saw it had three parts: data, decision and action (Simon, 1997c, p. 156). He argued Simon presumed the correctness of perceptions treated as data, albeit selected from a larger inventory, and, by ignoring the selection process, committed the 'naturalistic fallacy', conflating the prescriptive with the descriptive. Moreover, given that bounded rationality makes a theory of mind or mental operations a necessary component of the analysis, Viale argued that rather than Simon's sequential logic (such as the GPS or production systems approach), recent neurological research favored a connectionist, neural network model which would be shaped more by the actor's emotional state. Taken together, these criticisms raised the idea of replacing Simon's model of rationality with an entirely different 'inference-engine' model.

But Simon, citing the Italian edition of Sciences of the Artificial, accused Viale of "drafting the obituary of the symbol system hypothesis" before it had been falsified or replaced by something better (Simon,

1997c, p. 181). Evidently stung by being charged with the 'naturalistic fallacy', Simon also countered that describing and advocating are different behaviors and done by different people and that his theory of bounded rationality undertook to describe the processes humans use to reach their goals (Simon, 1997c, p. 186). Regarding emotion, Simon saw no reason to limit symbolic systems to the conscious aspects of human activity, and knew "of no reason why models and theories of emotions and motivations should be less symbolic than models of cognition" (Simon, 1997c, p. 182). This reprised one of AB's pivotal but seldom noted premises: that, absent an alternative theory of mind, Simon presumed the non-rational aspects of decision-making could and would be processed in the same mental logic machinery as are the rational aspects (Simon, 1987, p. 58). Put differently, Simon's concept of mind had but one mode that handled both conscious and non-conscious operations, rejecting Viale's pluralism and connectionism by assumption.

SIMON AND KNIGHT'S LANGUAGES

These cameos help illuminate Simon's oeuvre and how others responded to it. The story is untidy, neither complete nor determinative, but sufficient to show it is not enough to eulogize Simon without specifying his achievements' limits and critics, nor to demonize him as the bad boy of public administration. First, we are reminded our community needs more scholars with Simon's grit and temper to engage in bruising polemics as they promote discipline-shaping ideas. Our discipline loses when vigorous criticism is shamed or dismissed as unprofessional ad hominem name-calling and left unpublished. As Simon demonstrated, critique, not agreement, is the driving fuel of academic progress. These days, funds and grant chasing, just one of Simon's many skills, dominate deans' work. Disciplinary progress has been subordinated to institutional growth, financial and reputational, and fine buildings. There is little evidence of progress of the kind Simon sought, despite many calming claims that we are doing just fine (e.g., Thomas, 2022).

Can our community identify and measure Simon's contributions? Can we test them? Thanks in part to Simon, Fritz Machlup (1967) noted our community now plays a triad of language games: rationalist/marginalist/neoliberal (the Nobel Prize-endorsed scientific mainstream), behavioral/psychological/bounded (the new practice game) and political/institutionally and politically bounded (the old practice game). The naïve rationalist/political, scientific/interpretive and fact/value dualities have been superseded by this richer triad. This is progress indeed but scarcely innovation – more a recovery of the older institutional methods erased by the rise of positivism (Hodgson, 2001). But note this recovery is 'bounded' within the new 'small-world' framework of each island's heuristics and algorithms, whereas the 'old institutionalists' used broader society-wide political rhetoric.

In sum, this essay contrasts Simon's work against Knightian ideas in multiple episodes of scholarly interaction, sometimes direct, as with his PhD committee or with Perry, Waldo, Banfield, Storing, Lowi or Viale, and sometimes less direct, as with Argyris or Dreyfus (Gow, 2003). The disputes are our community's fireflies: to and fro then gone, with much mutual incomprehension and notably little mention of empirical testing or other resolution. No doubt there were other spats at conferences, in private letters, and elsewhere. Traces surely remain, especially in the Simon and Knight archives, awaiting recovery by researchers such as Hunter Crowther-Heyck and Ross Emmett. The disputes were not abstract battles between 'strawmen', for Simon was no naïve positivist chasing universals, rigorous theory, or falsifying proposals. He was a 'sophisticated' positivist. Specifically, as Potts argued, he separated the individual and their context, creating his own conceptual space for

entrepreneurial agency (Potts, 2000). His scissors posed new language making as the agentic actor's practice in the face of bounded rationality, where neither external nor internal agents' premises could be fully known or articulated.

Drawing conclusions from diverse premises is always a matter of the analyst's judgment, as is every syllogism's conclusion as a minor premise is conjoined with a major premise to generate new knowledge. A syllogism frames the most elementary meaning-changing communication: primary and secondary premises, a proposition and a conclusion. The conclusion defines a universe of novel meaning transferred by the listener's active imagining and learning, not as a unit of data delivered or as instance of proof but one of judging. The process is rhetorical, an instance of persuasion, imagination and channeled learning, not of power or of logic. As noted earlier, both Knight and Simon wrote about syllogisms. They presumed individuals' complementary freedoms to persuade and be persuaded, to learn and to teach. Rather than accept Simon's statement in AB that he sought only new vocabulary, he actually sought new concepts that would lead to the new syllogisms of his novel administrative discourse. His preference, versus Aristotle's categorical syllogism 'Man, Socrates and mortality' or the complexities of Knight's uncertainty, was for the empirical syllogisms of Ayer's logical positivism, where evidence data is taken to be what it seems to be, axiomatized and aprioristic as Viale suggested (Simon, 1997c, p. 154).

The debate over AI's nature and future (and Large Language Models) helps sharpen what language meant to Simon. At the beginning of AB he used the term vocabulary (Simon, 1958a, p. xlvi). Clearly this was not quite right, given the element-like concepts he sought would only be pertinent when articulated in conversation, enabling propositions, reasoning and rebuttals. In line with this chapter's epigraph, "reason goes to work only after it has been supplied with a suitable set of premises", he presumed an operational language. The term he needed might be narrowed from working language to the rhetoric of a Barnardian zone of discourse and thence to the organization as a particular context of practice-related language (Spender, 1989, 2014). Perhaps it can be further narrowed within that, to a conversation (Spender and Strong, 2014). But perhaps the micro-foundational element Simon had in mind was not an isolated premise; it was an interpersonal interaction, a unit of talk in the organization's jargon, though this is often oblique, subtle and veiled, non-verbal, embedded in the organization's own island of discourse (Spender, 2014, 2021).

Simon's intuition, perhaps inflected by Knightian notions of intelligence, was that administrative practice was not merely about making data-driven or 'evidence-based' decisions or about 'leadership' and issuing commands (Knight, 1997b, p. 101). Knightian uncertainty separated these two aspects. Admitting uncertainty meant that managing was instead more about resolving subordinates' uncertainties of action, thereby enabling them to act in an 'intendedly rational' manner, as intelligent agents. The intelligence necessary for executing an order always differs from that for generating it, a practice in a different context characterized by different uncertainties, constraints and issues. An actor needs a context of meaning or system of premises that resolve the individual's uncertainties about transforming the instruction into situated action. But given the residual uncertainties of practice and the differences in the contexts of instruction (managing) and acting, no instruction can ever be wholly sufficient to the practice intended. Skinner's behaviorism was often criticized for erasing the actor's thinking and judging by assumption (Anderson et al., 1998). Simon sought to capture the actor's choice of action as intelligent rather than as a

blindly behavioral. He presumed consciousness and language. His heuristic was a 'local' language that would bridge the gap between manager and actor precisely because of their shared commonsense.

Simon fleshed this out in Chapter VIII of AB, wherein he defined communication as "any process whereby decisional elements are transmitted from one member of an organization to another" (1958a, p. 154). He extended this with his theory of 'chunks' (Simon, 1974). Citing George A. Miller – with whom he had another up-and-down relationship (Simon, 1991, p. 224) – he focused on a chunk's size rather than its epistemological nature. Simon adopted the two-phase (fast/slow) model of human thought and memory found in John Locke's work. He did not analyze the differences between human and computer memory or between human and computer languages, nor the differences between procedural and substantive rationality, nor the differences between fact and meaning that stood behind his fact/value axiom (Simon, 1974, p. 482).

Simon's heuristics were empirically based syllogisms, hung between 'auxiliary hypotheses', their relevance and value 'tested' by practice (Gigerenzer, 2008; Romanycia and Pelletier, 1985; Simon, 1979, 1983a). The resulting 'small worlds' are bounded by the practical implications of concepts (premises) selected (Watts and Strogatz, 1998). But their interrelating or reasoning must also be 'perfect' within the resulting boundaries or else meaningless, just as computers go blind and halt on errors. Humans are not like this. Though they may not reason with the kinds of logic Simon had in mind as he castigated Waldo, human reasoning must work, that is, be processable in its context, like an algorithm. Effectuation is the process of completing the heuristic's language boundary, vocabulary and grammar, adding the final bricks that separate its internal reasoning context from its environment, distinguishing its emic and etic, and letting the emic language flourish into the internal communication Simon axiomatized as the essence of 'organization' (Sarasvathy, 2001). As Newell and Simon showed, modern computing can extend a heuristic's boundaries far beyond what we humans can handle unaided, coded as mini-institutions or networks of meaning, richer than the dozen or so premises I found (Spender, 1989). Yet the more complex the language in use, the more problematic is its reach and relevance to human affairs and our natural languages. Philosophy's task is curating the construction and use of a language to ensure both its integrity and its relevance to the human condition.

The contrast basic to this chapter lies between what can be said usefully within a heuristic versus engaging the 'un-languaged' uncertainties of what lies silenced beyond its limits – yet are still material to the actor. This contrast is the essence of Knightian uncertainty and of "Limitations" (Knight, 1924). In colloquial terms, the 'so there!' that Simon sought as a rigorous conclusion within the heuristic's 'ontologically closed' language contrasts with the open 'so what?' that Knight pointed to, evoking the realm of ethics and values that forever lay beyond the heuristic's grasp. The distinction was not merely based on a cognitive model and its limitations but in the generative action of Simon's scissors, in the complementary philosophical aspects of the individual's response. Simon sought closure, efficiency and predictability while Knight wrote: "science … is the technique of prediction" (Knight, 1997b, p. 101). Positivists read this as a call for objectivity. But Knight was focused elsewhere on the individual's freedoms to explore the construction of human language and social interaction and thereby the creation of new social worlds. He queried how social institutions came into being and were shaped, and so enhanced the evolutionary processes of living 'intelligently'.

Knight used the term intelligence in a specific way, somewhat aligned with today's mindful. It could never be 'artificial'. It was more his definition of being human – open, dynamic, agentic, engaging uncertainty and unbounded, accumulating or revising, revealing our deeper insights and higher needs as it advances, dealing with the challenges of being in the world as an inherently political and ethical process. There is a similar contrast in the visual arts between positive (objectified) space and negative (imagined) space. Hence the many Knight-oriented scholars protesting Simon's thinking, sensing it as conflating rational and bounded. Unfortunately, we lack evidence that Simon ever studied "Limitations". That he did not would seem extraordinary, given his time in University of Chicago's libraries and economics department, his intellectual appetite and interest in the philosophy of science, his academic friends and activities. But there it is, never cited. Yet who knows? There was Knight's "The planful act: The possibilities and limitations of collective rationality", a lecture presented at Chicago in 1944 (Knight, 1982b). He mentioned a conference he had recently attended at the university at which an unnamed speaker surprised him with curious views about planning apportionment of funds between individuals and government. Simon was in Chicago at IIT. Perhaps he attended this conference?

CODA

At the end of his career, the prodigal Simon was welcomed back by APSA to give the 2000 John M. Gaus Lecture. Simon began with the 'market or hierarchy question' and pushed the historical benefits of 'organization' while accepting that social progress had been driven by two centuries of technological innovation. He segued into a broader discussion of fairness and the social distribution of power, inviting his audience to estimate the extent to which their personal wealth was the result of their own efforts or the benefit of being born in the US (Simon, 2000b, p. 755). He could have cited the work of Deirdre McCloskey, sometime of Chicago, and her arguments about the Great Enrichment (McCloskey, 2016). He could have cited Knight's triad of wealth sources: inheritance, individual effort and luck, as well as Knight's turn to social philosophy (Knight, 2006 [1921], p. 352). But he concluded on a Barnardian note: 'It is not too fanciful to think of writing a history of human civilization in terms of progress in the means of human cooperation, that is, of organization' (Simon, 2000b, p. 756).

When estimating Simon's legacy, it may be more constructive to focus on his openness and pugilistic eagerness to push forward and take up new challenges, whether that meant engaging Bertrand Russell, learning new computer languages or mastering Japanese or Swedish. In short, Simon's life philosophy and practice seemed more significant than his achievements, intellectual or institutional (Simon, 1992; Spender, 2013). Near the end of his life, in "Bounded rationality in social science: Today and tomorrow", Simon thought once again about uncertainty – naming but not citing Knight (Simon, 2000a, p. 27). Using my four previously introduced categories of uncertainties, he distinguished ignorance arising from our cognitive limits versus the uncertainties of indeterminacy arising from our interpersonal interactions, as in his undergraduate paper for Kerwin. Then, still envisioning his own science of psychology, he ruminated about systematizing bounded rationality. He had four headings: tools for finding empirical phenomena, tools for building theories, tools for testing theories, and dealing with uncertainty (Simon, 2000a, p. 35). The first three reflected his positivist notions, but the last vaulted beyond his science's boundaries. Echoing RUP, he distinguished uncertainties about the future environment, reactions to other actors and changes in one's own tastes and values, a

triad of ignorance, indeterminacy and incommensurability. It only remained for him, ever the skilled debater and prodigious wordsmith, to identify the limitations to his novel language of administration versus his much-loved mathematics – in short, how his administrative language could be heuristic and relevant to social practice rather than merely algorithmic.

NOTE

1. https:// digitalcollections .library .cmu .edu/ cmu -collection/ herbert -simon

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