Journal of the History of Economic Thought,
Volume 38, Number 3, September 2016

OTTO NEURATH AND THE LINGUISTIC TURN IN ECONOMICS

BY
MICHAEL TURK

In the history of economic thought Otto Neurath, who is known foremost for spearheading the development of the Vienna Circle of philosophers, has served largely as a foil for his advocacy of in-kind calculation and economic planning. Yet Neurath, who was trained as an economist and wrote extensively about economics, including its philosophical foundations, held an abiding interest in the use of language in science, and was strongly influenced by turn-of-the-twentieth-century conventionalists, among them Henri Poincaré and Pierre Duhem. Consequently, Neurath's critique of what he saw as the conceptual flaws of economics and its too narrow framework as price theory was rooted as much in its imprecise and 'unsorted' use of language as in his critical view of capitalism. As such, he anticipated the 'linguistic turn' in economics that gained prominence only a half-century later, without any recognition of his presaging role.

I. INTRODUCTION

Otto Neurath's place in the history of economic thought remains somewhat elusive. He has served largely as a foil for his advocacy of in-kind calculation and economic planning. In 1920 Ludwig von Mises cited Neurath's ideas about the virtues of in-kind or natural calculation superseding monetary calculation in effectuating a planned economy as one of the bases against which he made his case that socialist calculation, and hence a planned economy, was not possible (Mises 1920, pp. 102, 119). In 1935 Friedrich von Hayek followed suit, identifying Neurath and Otto Bauer, a well-regarded Marxist economist and leading figure among the Austrian Socialists, as the "most interesting" or "most representative" exponents of socialization (see, for example, Bauer 1919), a form of collectivist economic activity to which Hayek was unalterably opposed (Hayek 1935, pp. 30–31). Neurath served as an intellectual foil

Michael Turk, Economics, History, and Political Science, Fitchburg State University, Massachusetts.

ISSN 1053-8372 print; ISSN 1469-9656 online/16/03000371-389 © The History of Economics Society, 2016
doi:10.1017/S1053837216000377

Downloaded from http://www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http://www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

for Hayek on a second count: late in life Hayek recounted that it had been the stridency of Neurath's position on the unity of all sciences that had propelled Hayek to comprehend an insuperable methodological divide between economics and the physical sciences (Hayek 1994, p. 50).

Neurath, a polymath in the central European tradition, is best known for his intellectual and organizational efforts spearheading the development of the Vienna Circle of philosophers. However, Neurath's educational background and academic career centered on the field of economics. He prepared his dissertation on trade and industry in classical antiquity at the University of Berlin, defended it before Eduard Meyer and Gustav Schmoller, then taught for a time at the Vienna Handelsakademie and later at the University of Heidelberg.

Moreover, Neurath wrote extensively about economic matters and ideas over the course of his lifetime. A volume of his major economic writings appeared in 2004, edited by Robert S. Cohen, with a lengthy overview of his ideas provided by Thomas Uebel. In examining his economic writings, leading Neurath scholars like Elisabeth Nemeth have described Neurath's ideas about economics as having crystallized in the period prior to the establishment of a new consensus about economic theory in the 1920s and 1930s, characterized by George Shackle as a defining "age of high theory" (Nemeth 2008, p. 5). They tend to situate Neurath's contribution to economic thought in his call for qualitative standards, beyond the now current quantitative measures, to gauge economic well-being, anticipating in certain respects the outlook of Amartya Sen. In addition, they cite his innovative use of graphic art to represent the 'totality' of economic experience (Leonard 1999). Beyond this, John O'Neill has sought to highlight what he sees as an early or inchoate version of 'ecological economics' in Neurath's work (O'Neill 1999, 2004).

I would contend that there is yet another strand to Neurath's legacy in the history of economic thought: that underlying Neurath's rethinking of the traditional cul-de-sacs found in the philosophy of science was a critique of the nature and use of language in any and all scientific disciplines, characterized as a 'linguistic turn,' and that this critique held with special force for economics.

Here, Neurath's central place in the workings of the Vienna Circle of philosophers is pertinent. If one looks at the salient aspects of the Vienna Circle's work and program as it emerged in the late 1920s, one finds a heightened, even defining role for language in establishing the bases upon which any field or discipline might be understood as scientific. As the circle's manifesto indicated, an unambiguous language, free of all metaphysical accretions and distortions, underlay the possibility of attaining a unity of all science. In part, the circle's focus upon such a role for language grew out of intense discussions of the relation between statements and propositions, on the one hand, and the facts of the world, on the other, initially raised by Ludwig Wittgenstein's *Tractatus*. It was also evident in the continuing discussion within the circle in the 1930s about the use of 'protocol sentences' and the debate about the primacy of a phenomenalist or a physicalist language upon which all fields of science could be built.

For Neurath economics had to be subject to a strenuous critique of its language, as the failure to attend to the terms used to form essential concepts and establish thereby the bounds and significance of the field's content meant that the foundation upon which economics was built was fundamentally flawed.

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

As such, one might well argue that this kind of philosophical inquiry, with its sweeping methodological implications, paralleled the work of Neurath's archrival, Hayek, whereby a linguistic turn in economics might have opened the field to new possibilities, just as Hayek's emphasis upon the role of information in economics did. The difference here is that this linguistic turn did not occur until many decades later, without any apparent awareness of Neurath's presaging work. Oftentimes this turn was more at the level of rhetoric than in the substantive way that Neurath had emphasized: as the imprecise transfer of the language of customary or institutional practices to an intellectual discipline. This difference in impact may also be viewed as stemming from a broader recategorizing of the ideas and concerns raised by Neurath as 'sociology' rather than 'economics,' the often overlooked default that followed from the failure to produce and sustain a robust historical economics, affecting Max Weber as well as Neurath.

As a preliminary matter it is important to note that much of the recent scholarship on Neurath's philosophical stance has taken shape through a nuanced inquiry into, and rethinking of, his perspective on the nature of philosophy and science, emphasizing his anti-foundationalism and naturalism, the notion that there is no philosophy separate from science. I do not see these elements of Neurath's thinking as necessarily inconsistent with his treatment of a linguistic turn in economics. The intersubjectivity of language, which he contended made science possible, informed Neurath's naturalism (Cartwright et al. 1996, p. 141), and required the elimination of terminology weighted down by any metaphysical baggage—in the case of economics, a wholesale enterprise. Moreover, Neurath's anti-foundationalism appears rooted in the conventionalism of, among others, Henri Poincaré and Pierre Duhem, discussed in greater detail below, however much he may have modified and deepened it.

II. SITUATING NEURATH IN ECONOMICS

It is worth situating Neurath within the world of economic theorizing and thought, noting that his involvement with the discipline of economics changed markedly over the course of his variegated career. He was actively engaged in writing about 'theoretical economics' in the years leading up to World War I, and was clearly conversant in the prevailing economic discourse of the period. At the same time he produced an economics textbook and, in collaboration with his first wife, Anna Schapire Neurath, prepared a reader in the history of economic thought.

In articles appearing in leading central European journals in 1910 and 1911, he challenged the construction of economics around markets and price theory, abetted, he contended, by the loose use of what were deemed to be fundamental concepts. In these essays Neurath referenced, cited, and critiqued major contemporaries, or near contemporaries, like Stanley Jevons, Alfred Marshall, Vilfredo Pareto, and Léon Walras, along with central Europeans like Carl Menger, Eugen von Böhm-Bawerk, Joseph Schumpeter, Ladislaus von Bortkiewicz, and Max Weber. He attended to a raft of German economic thinkers, from the mercantilist Johann Joachim Becher, through Friedrich List and Hermann Henrich Gossen, to the 'state socialist' Johann Karl Rodbertus and the leading figures of the German Historical School, including Wilhelm Roscher, Karl Knies, Gustav von Schmoller, and Lujo Brentano.

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

In the two-volume reader in the history of economic thought Neurath introduced texts and excerpts from, variously: Plato, Aristotle, Nicholas Oresmus, Becher, David Hume, Adam Smith, and David Ricardo (in Volume I); and Johann Heinrich von Thünen, Wilhelm Roscher, Gossen, Karl Marx, John Stuart Mill, and Karl Vogelsang (in Volume II). Notably, the Neuraths took pride in presenting selected texts from Oresmus, François Quesnay, and Anne Robert Jacques Turgot that had been translated into German for the first time (Neurath [1910] 1913, pp. I, VII).

With the end of World War I, and the full flowering of his political and social activism, combined with an embrace—characteristically unorthodox—of Marxist ideas, Neurath became less engaged in the economics profession, no doubt spurred on further in that direction with the loss of his academic post at Heidelberg. This was evident in his later theoretical work, as the economic thinkers to whom he refers in his 1944 monograph, *Foundations of the Social Sciences*, were little changed from those he cited three decades before. For example, in this later piece he faults the flaws in the use of language by Thomas Malthus and Marshall, and emphasizes more the ideas of classical economists rather than neoclassical ones.

Neurath's distance from the debates among economists that took center stage in the 1920s and especially the 1930s should not vitiate the significance of his insights about the problematic nature of the language used—and the concepts formed thereby—in economics. It may in fact have opened the way to seeing things differently, and brought out links, however partial, between the turn-of-the-century philosophical debates and conventionalism, and more contemporary ideas or perspectives, including postmodernism, focused upon the role of language and narrative.

III. ON THE TRAIL OF POINCARÉ AND DUHEM

As a long-time critic of capitalism, Neurath was steadfast in his opposition to limiting economics to price theory and the conventional treatment of markets. This was the case both in his early, formative days when one can detect some affinity to the German Historical School and manifested as well when he was most closely associated with Marxism. At the same time, what stands out forcefully in his critique of economics is his criticism of the use of language in economics. Here Neurath sees the words and phrases favored by economists as essentially a mask, concealing both the lack of clarity and solid empirical grounding for such terminology, as well as the institutional or customary framework that serves as the sole basis for making it appear meaningful.

As Neurath recounted:

> I started in my university days rather primitively by making a collection of 'dangerous terms'. Before I started making this collection (I sometimes called it in joke [sic] my 'Index Verborum Prohibitorum'). I tried to criticize books and articles. Particularly I was busy with reading Adam Smith's *The Wealth of Nations* along the lines of an analysis of language…. I altered successively my own terms in all my articles and books in accordance with my increasing Index by eliminating 'emotional', 'concealing', and 'confusing terms'. (Neurath 1941, p. 132)

Moreover, for Neurath economics as a field tended to parlay a grand illusion of scientific precision, whether through its use of empirical data or its incorporation of

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

mathematical nomenclature and techniques. He invoked the advances made in theorizing about physics and its nature as a discipline, especially by the turn-of-the-century conventionalists like Henri Poincaré and Pierre Duhem, as well as Ernst Mach, as a rebuke to economists, who failed, he felt, to grasp their insights or approaches. Indeed, the notion of such scientific precision as a mask echoes the critique of scientific language by Poincaré in *Science and Hypothesis*, a work to which Neurath referred in his 1910 essay on the theory of the social sciences (Neurath [1910] 2004, p. 266). Notably, the preface to the German translation of Poincaré's work, which served as Neurath's source, gave particular emphasis to Poincaré's view of the axioms of geometry and the principles of mechanics as none other than "verkleidete Definitionen" (Poincaré 1906, pp. IV–V).

According to Rudolf Haller, a survey of the indices of Neurath's methodological and philosophical writings over the course of his career reveals that, apart from his 'contemporaries' associated with the Vienna Circle and the logical empiricist movement, Mach, Poincaré, and Duhem were the most cited (Haller 1991b, p. 108).

Neurath scholars, among them Jordi Cat and Thomas Uebel, have traced Neurath's philosophical rejection of the construction of any science on a 'pyramidal' foundation back to the influences of these conventionalists. In fact, both Cat and Uebel see Neurath's view of the necessary lack of any foundation to the making or practice of science, captured metaphorically as 'Neurath's Boat,' as more all-encompassing (Cartwright et al. 1996; also Uebel 1996, pp. 106–107).

Of Poincaré and Duhem, Neurath most often referred to the two of them together for contemplating the necessary existence and problematic nature of 'systems of hypotheses,' recognizing that multiple plausible ones can be produced in construing a given set of circumstances (Neurath [1946] 1983, p. 231).

This provides a remarkable counterpoint to the more general, if not universal, tendency of economists to align their work with that of the supposed paradigm offered up by classical physics (Turk 2006). It held even when, as was the case for Walras, correspondence with Poincaré and other French mathematicians reveals serious cautions on their part about the path he was pursuing, among other considerations the assumption of unerring clairvoyance and rationality (Turk 2012). For Neurath such assumptions constituted a misguided form of Cartesianism or Laplacian 'absolutism' that he also categorized as 'pseudo-rationalism.'

The powerful influence of both Poincaré and Duhem on the thinking of Philipp Frank, Neurath, and Hans Hahn, the core figures in the first Vienna Circle, was captured in Frank's retrospective account of its genesis and development. Speaking for the group, Frank downplayed the influence of Ernst Mach (Frank 1949, p.7).[1] Instead, it was Poincaré who received special approbation for "bridg[ing] the gap" betweem the "vague and complex" nature of empirical observation and the generalizing concepts and statements forming the "principles of science" (Frank 1949, p. 8).

While Neurath's early, yet lasting, embrace of critical aspects of the conventionalism of Henri Poincaré and the pluralism and holism of Pierre Duhem has been noted

[1]Elisabeth Nemeth has given great weight to a glowing letter which Neurath wrote to Mach in 1915, emphasizing its importance in shaping his 'holistic' perspective, yet Frank's account suggests at the least some tension between Mach's influence and that of Poincaré and Duhem, a point noted by Rudolf Haller (Haller 1991b, p. 99).

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

as an essential strand within his philosophy of science (Uebel 1996, pp. 122–133), less attention has been given to the extent to which Poincaré and Duhem influenced Neurath's ideas about, and critique of, economic theory.

Poincaré's influence can be felt in at least two ways that can be regarded as formative for Neurath's treatment of economic theory. In his popular writings about science Poincaré scored what he saw as the lack of content of many of the terms commonly used by physicists, including 'mass.' He sought to root out impredicative definitions, in which supposedly scientific terms were defined in circular fashion, ultimately, in other words, in terms of themselves, and so were effectively devoid of any substantive meaning.

For Neurath economic concept formation suffered similarly from a fundamental weakness in the language in which such concepts were couched. In his early 1910 essay, built around a critique of the then highly influential work of Wilhelm Wundt,[2] he referred to the "unsorted terminology" employed by economic theorists. He drew a contrast between the looseness with which economic theorists put together their concepts and the rigor of the approach pursued by physicists, like Poincaré and Duhem, for whom "the origin of the concepts and of the problems are traced right from the initial observation of fact, if at all possible" (Neurath [1910] 2004, pp. 268–269). Whereas, for economists, "[n]ot infrequently there is only very general talk of 'capital', 'price', 'value', etc." (Neurath [1910] 2004, p. 269).

Neurath also challenged the emergence of marginalism as dependent upon the faulty adoption of language. This proved to be the case for the most basic concepts used. For example, he pointed to the longstanding and continuing difficulty of defining the object of economic activity as "the economic good," a term embraced by the marginalists (Neurath [1910] 2004, p. 274).

This wobbly foundation engendered new problems. "It became necessary to create a simplified science of motivations; partly under this influence, marginal utility theory was developed, a purely psychological discipline" (Neurath [1910] 2004, p. 274). (This last characterization echoed the view of Lujo Brentano, whose blistering critique of Carl Menger on this point prompted a strenuous counterattack by Weber.)

In *Science and Hypothesis* Poincaré also made a strong case for rethinking the notion of measure in science, advancing claims for a more qualitative mathematics in the process. Poincaré laid out the basis for treating 'non-measurable magnitudes' as measures worthy of science, emphasizing their role in ordering or arranging relations between pertinent scientific variables to achieve significant results (Poincaré 1906, p. 28). In making his case, Poincaré drew upon Gustav Fechner's 'psycho-physical' studies to demonstrate the disjuncture between the 'physical continuum' and a mathematically constructed one (Poincaré 1906, pp. 22–28).

This might appear, on the surface at least, as a call for ordinal rather than cardinal measurement, which indeed did appear in Neurath's critiques of measurement in economics (Neurath 1944, p. 33). In fact, Thomas Uebel has suggested that in doing so, like Poincaré, "[Neurath] was influenced in part by considerations from [Fechner's]

[2]While primarily a psychologist, Wundt gained scholarly renown, especially in central Europe, for his *Logic of Science*, in which he sought to classify and differentiate among the physical sciences and the 'intellectual' or 'cultural' sciences. Like Neurath, Max Weber challenged Wundt's schema at the center of his 1906 methodological critique of Karl Knies.

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

psycho-physics" (Uebel 2004, p. 37). Neurath's critique of the limitations of quantitative measurement in economics was evident early on in the 1910 essay: "Wundt emphasizes that political economy developed because measurable quantities were available. This indeed is the position of most political economists: only where there are measurable quantities can there exist a theory" (Neurath [1910] 2004, p. 274).

Neurath elaborated upon the virtues of qualitative or ordinal measures in his discussion of 'transfer conditions,' through which term he meant to broaden the framework or bases for exchange beyond the exclusive reliance upon market prices. Here, Neurath contended that a ranking system, what he referred to as "relations of order," was all that was required to provide the exactitude associated, mistakenly, with only "measurable quantities" (Neurath [1910] 2004, pp. 276–277).

However, there are additional nuances to discern in highlighting the primacy of relations among variables. Neurath would establish tables, in symbolic form, to compare the value of different combinations of goods and, from that, life situations that would make possible the rational comprehension of the reallocation of resources to produce the most desirable outcome. At the same time, he stresses, time and again, the straitjacket imposed upon economics by the demand or requirement that any and all phenomena of significance be measurable as quantities. Neurath sees this as the means whereby economic theory is reduced to price theory, and monetary calculation comes to be understood not as one of the variety of means of exchange but rather as the standard measure for all economic calculation.

In his later work Neurath put forward an 'holistic' view of economic activity that was consistent in its initial outline with Pierre Duhem's treatment of the philosophy of science. Uebel in fact sees Neurath as "extend[ing] and radicali[zing] Duhem's result . . . to all sciences," but also incorporating into it "the historical conditioning of concept formation" (Uebel 1996, p. 131).

But Neurath's holism in grappling with economic systems of organization also has a certain resonance with the approach taken by the German Historical School. The influence of Duhem is likely greater in one crucial respect, as Neurath took as one of the central tenets of his philosophy of science the need to introduce auxiliary hypotheses. This was Neurath's counterpart to Duhem's notion of 'underdetermination' in all scientific theorizing. As Neurath stated in his 1944 essay, "in the social sciences" even "relatively simple stories are full of hypotheses" (Neurath 1944, p. 14), requiring a choice to be made among various additional or 'auxiliary' hypotheses to determine the narrative ultimately put forward.

IV. NEURATH'S CRITICAL PROGRAM IN ECONOMICS

Neurath's critical program in economics was built around three essential elements that can be traced in the papers and monographs he wrote across the entire span of his career and lifetime, from a relatively early essay entitled "Zur Theorie der Sozialwissenschaften," dating from 1910, through a 1935 tract, "Was bedeutet rationale Wirtschaftsbetrachtung?," to a 1944 monograph titled *The Foundations of the Social Sciences*.

First of all, according to Neurath, the nature and scope of economics tended to be conceived of too narrowly, as economics needed to be comprehended as the study of

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

'systems of organization' of economic life, rather than be limited to the activities and affairs of the 'market economy' (Neurath [1910] 2004, pp. 272–273). While this may, with reason, be thought of as either a Marxist understanding of the nature of economics[3] or a framework initiated anew by Karl Polanyi,[4] the initial inspiration for this approach to economics cited by Neurath was Friedrich List (Neurath [1910] 2004, p. 273). Thus, it grounds the notion of 'systems of organization' in the terrain of the German Historical School, which is in fact a concept that Neurath identified at the center of Roscher's work as the founder of that school (Neurath 1913, vol. I, p. 100). Even in somewhat later works in which Neurath had come to embrace Marxist ideas, he continued to cite List as one of his major influences, including in the article "Total Socialisation," which appeared in 1920 (Neurath [1920] 2004, p. 374).[5]

Neurath's approach to economics was reinforced by his fondness for two economic visionaries who were both utopian and unorthodox in their outlook: Josef Popper-Lynkeus and Karl Ballod-Atlanticus. The latter's *Zukunftsstaat*, first published in 1898, laid out a statistically based program for a transformative 'leisure-oriented socialism' infused with the virtues of mass production and the utopianism of Edward Bellamy. For all that, Ballod managed to run afoul of both "bourgeois" and socialist economists, as Neurath would later as well (Balabkins 1978, p. 5).[6] Late in his career, while in England, Neurath reflected upon the fact that thinkers like Popper-Lynkeus, who had also early on laid out the bases for some sort of economic plan, were not easy to pigeonhole as distinctly capitalist or socialist (Neurath 1943, p. 149).

For Neurath the focus upon economics as the study of various systems of organization (presumably economic and social, and perhaps, following the track taken by the historical school, cultural as well) placed him in opposition to Vilfredo Pareto, whose "mechanical analogy has contributed specifically to the advancement of the study of homo oeconomicus" (Neurath [1910] 2004, pp. 273–274). Moreover, according to Neurath, "Exact economics [for which Stanley Jevons and Pareto serve as exemplars] has neglected almost entirely the theory of the crises of overproduction, which is amenable to symbolic representation since it contains relations which concern the circulation, the transfer of goods, etc., and not just the level of prices" (Neurath [1910] 2004, p. 277).

Pareto's reliance upon 'measurable quantities' in constructing a system of level curves, which Neurath regarded as a crucial failing (Neurath 1911, p. 79), brought to light the second element in Neurath's program: the need to establish "a calculus of

[3]One might see this presented along the lines, say, of Paul Sweezy's *Theory of Capitalist Development,* intended to serve as a counterpart and response to his mentor Joseph Schumpeter's *Theory of Economic Development*.

[4]Giandomenica Becchio in fact sees something of the reverse, with Neurath's notions of 'administrative economy' and 'economy in-kind' serving as important influences upon Polanyi's emerging framework for economics (Becchio 2005, p. 16).

[5]Eduard Meyer was also cited as a major influence in that article. Notably, Neurath made the case that in-kind economy gave way to a money economy not because of the exigencies of complex economic relations in the states of classical antiquity, but rather because of the perquisites of international trade.

[6]Ballod (Ballod-Atlanticus was a pen name) had seen certain limitations to Marxism. In particular, "in Ballod's eyes, Marxism was only a theory of capitalist breakdown, not a theory of socialism" (Balabkins 1978, p. 218). This was a concern that Neurath, both as a writer about socialization and a socialist planning administrator, also had to contemplate.

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

relations independent of measurable magnitudes" that would inform "all of political economy." Such a calculus would allow for the "exact treatment" of "comparable magnitudes" and take into account "combinatorial problems" as well (Neurath [1910] 2004, pp. 278–279).

Hence, from Neurath's perspective, all sorts of 'non-measurable magnitudes,' borrowing directly from the language of Henri Poincaré, needed to be incorporated into an economics that addressed a 'complex' of experiences that Neurath characterized as 'living situations.' This stood in contrast to any individual or disaggregated datum couched as a number. Poincare's discussion of non-measurable magnitudes also emphasized the importance of capturing 'relations' among phenomena or variables, much as Neurath championed the role of relations between and among various economic phenomena.

Within the scope of comprehending measurement, Neurath also saw the virtue of using symbolic measures. Building upon his study of Ernst Schröder's algebraic logic, Neurath trumpeted the advances made in the fields of combinatorics and symbolic logic, and envisioned a logical calculus as facilitating the comprehension and calculation of relations among objects of nonmeasurable magnitude.

For all that, Neurath's subsequent work in economics tended to draw upon mathematical techniques, intuition, or models only to a rather limited degree. This, though, should not be treated as an intellectual pathway not pursued or as a consequence of Neurath's shift toward sociology. Instead, one might see Neurath's pedagogical experimentation in visual communication in the 1920s and afterward as constituting an outlet for his methodological inquiries in economics. As Keith Tribe has suggested, Neurath's introduction of *Bildstatistik* and the Isotype method was intended to provide a more adequate representation of economic data than numbers or indices could, through the creation of a visually accessible totality that captured the complexity of 'living situations' (Tribe 1995, pp. 163–167). This notion has been elaborated upon by Robert Leonard (Leonard 1999) and was the subject of an International Ludwig Wittgenstein Symposium devoted to an exploration of the range and implications of "Otto Neurath's Visual Language" (Heinrich et al. 2011).

It was also a matter of language. As Neurath noted: "The rules of picture writing are different. Starting with 'icons' implies far reaching limitations of language, but these limitations sometimes eliminate much danger" (Neurath 1941, p. 133), thereby alluding to the 'dangerous terms' he had consistently sought to eliminate from the economics lexicon.[7]

All of this in turn led Neurath to the third element of his critique, which was to characterize economic experiences as 'clots' that could not be captured by the kind of law making or rule making that characterized the thought of classical economics or the newly emergent neoclassical economics. These clots were formed from the "irregularities" and "indistinct" qualities of the world as observed, and are conveyed as such through "our daily speech." They stand in contrast to the notion that any scientific inquiry begins with "'simple basic assertions', 'atomic ideas', 'sense data', or their phraseological substitutes, i.e., something elementary, primitive, and poor" (Neurath 1944, p. 18).

[7]In the last decade Neurath's interest in the use of visual symbols to serve as a universal language has also been explored in greater detail in relation to his work in urban and community planning and his association with architects like Le Corbusier and Laszlo Moholy-Nagy. (See, for example, Vossoughian 2011.)

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

Instead, such complexes comport with the 'incompleteness' Neurath, in line with his anti-foundationalist perspective, associated with the notion of scientific knowledge as an encyclopedia, which informed the scholarly project, the *International Encyclopedia of the Unified Sciences*, in the last decade of his life.

As Neurath expressed this notion in a 1941 presentation before the Aristotelian Society on 'Universal Jargon and Terminology,' this was a matter that had to be comprehended through language, whether as speech, noted above, or as statements, below:

> Our initial observation statements in the sciences are not 'atomic', but are already imbedded [sic] in a body of statements derived from various sources, composed of indefinite terms such as 'microscope', 'looking through', 'inconsistent group of observed data'. Consequently no 'unique system of the world' remains, such as the 'rationalists' expected to find behind the screen, but bundles of bodies of statements which all more or less fit into our scientific pattern. (Neurath 1941, p. 129)

Accordingly, Neurath adopted a critical view of efforts to create scientific systems that proved more far-reaching than that taken by skeptical conventionalists, as such systems should be regarded as falling short of even becoming systems at all. Moreover, he noted, "it frequently happens that a certain theory useful in a determined field contradicts another theory useful in a different field. We have to compare bodies of statements which are not yet 'systems'" (Neurath 1941, p. 130).

V. RATIONAL ECONOMICS

Neurath's monograph on the theory of a rational economics dates from 1935 and forms part of a series devoted to the creation of a unity of sciences across disciplines. It carries forward many of the themes about the nature of economics that he had advanced from the earliest days of his economic pursuits. In the monograph Neurath retained and amplified the notion that the object of economics, and hence that which should accordingly be measured in economics, is what he called "life situations." From that Neurath contended that monetary calculation could not provide the full measure of economic value (Neurath 1935, pp. 45–46), and against which he continued to set in contrast 'natural calculation,' despite the opposition to this idea from both anti-socialists and socialists (Chaloupek 1990, pp. 668–670). For Neurath, monetary calculation is identified as historically based: that is, as a customary practice and, like the terms 'cost,' 'gain,' and 'loss,' is derived from commercial activity (Neurath 1935, pp. 31–33). Neurath's enthusiasm for in-kind calculation was in fact rooted in his study of the economic organizations of the major states of classical antiquity, but especially that of ancient Egypt.

His focus upon the centrality of life situations led him to see the need for applying an institutional framework to evaluate the virtues of different systems of economic organization, as the assessment of the correlation of different life arrangements with life situations formed the basis for a rational economics (Neurath 1935, p. 46).

The 1935 critique challenges, at least obliquely, any recourse to subjective value in economics. Neurath's contemporaneous monograph on 'empirical sociology,' whose treatment of the history of economic ideas drew heavily from the materials the Neuraths had presented in their 1910–11 reader, was nonetheless more infused

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

with a Marxist perspective. As such, in this work Neurath was at pains to point out that the introduction of valuations of the rightness or fairness of any economic action or development, which necessarily has a subjective quality to it, undermines the ability to establish an empirical test (Neurath 1931a). At this stage Neurath took the position that neither ethics nor volition produced changes in society; only the assertion of economic interests capable of forcing change could, and that was a measure of the class struggle.

Instead, such ethical or volitional valuations represented one form or another of metaphysical pseudo-rationalization, the nemesis of the scientific worldview espoused by the Vienna Circle and articulated in its manifesto. In turn, Neurath emphasized the importance of analyzing 'behavior' in economics, as behavior could be subject to meaningful empirical testing. Curiously, though, one might posit, along with neoclassical, Austrian, or Keynesian theorists, that economic behavior sprang from psychological sources or motives, which would reintroduce subjective elements into economic analysis.

It is also set in tension with Neurath's view of the centrality of life situations, as these call for valuations that might be regarded as ethical, where 'happiness' trumps technical efficiency, evoking ironically at this moment the 'ethical standard' that Schmoller had touted. Here, Neurath sought to transcend any seeming disjuncture between subjectivity and objectivity by claiming the possibility that all terminology and measures could be translated into an empirically based physicalist language (Neurath 1935, pp. 9–11; also Neurath 1931b).

One of the most striking aspects of Neurath's 1935 critique of economics was his rejection of the conventional notion of capital, an exemplar of his case that a flawed linguistic foundation underlay broadly accepted economic concepts. Fundamentally, Neurath saw no basis for treating capital as homogeneous.

Geoffrey Hodgson contends that Thorstein Veblen's 1908 article challenging neoclassical capital theory constitutes one of the earliest signposts in this later critique of the nature and meaning of capital (Hodgson 1997, pp. 101–102). Neurath's aversion to the term 'capital,' though, was equally long-standing, dating back to his student days in Berlin in 1906, when it entered, and remained henceforth on, his index of dangerous terms (Marie Neurath 1973, p. 7).

Neurath took the matter a step further, linking it to an illusory practice of categorizing and quantifying (Neurath 1935, pp. 41–45). He viewed the pricing of the cost of factors of production as essentially unnecessary or arbitrary, a form of naming that masks a lack of content. In this regard Neurath appears once more to be following elements of the conventionalism of Poincaré. Moreover, one might see in this challenge to the very notion of generic factor pricing a response and rebuke to neoclassical economic thought generally. See, for example, Neurath's critique of the use of factors of production in economic analysis as "insufficiently analyzed" and "mostly unnecessary" (Neurath 1911, p. 76).

In this instance it is directed at those like Ludwig von Mises who had contended that socialist—that is, natural or in-kind—calculation had no mechanism to adequately price factors of production. After all, it was with regard to production itself, the generation of capital goods required, that von Mises had identified as the most glaring weakness in any 'socialist calculation.' The implication in Neurath's critique was that monetary calculation only appeared to establish 'logically satisfactory' factor pricing.

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

Neurath chose to demonstrate the heterogeneity of resources required through the example of the wherewithal required for a naval conflict. Hence, Neurath's example hewed to the model of a wartime or command economy, whereby the changes wrought by the exigencies of war are understood to have a lasting effect upon the operation and structure of the economy (Neurath 1935, pp. 44–45). At the same time, to be consistent, this left open the question as to whether this critique of the use of the term 'capital' applied fully to all economic systems of organization.

VI. 1944 VOLUME: A SHARPENED FOCUS ON LANGUAGE

The 1944 volume, *The Foundations of the Social Sciences*, written in English, was one of a series of monographs intended to form an *International Encyclopedia of the Unified Sciences*. One of its most striking features is its sharpened focus on language, which, as both text and footnotes bring out, reflects Neurath's involvement with the Vienna Circle and the panoply of activities related to it. It also serves as the source of the majority of economics terms deemed to be excluded on Neurath's 'Index' (see Reisch 1997b, pp. 473–476). While the 1910 article takes the critique of the nature of scientific disciplines by Wilhelm Wundt as its point of departure, the 1944 work is replete with references to Rudolf Carnap, Hans Reichenbach, and Charles Morris, among others, all of whom were connected with the logical positivist, logical empiricist, or 'unity of science' movements that had been at the center of Neurath's life's work since the 1920s. This attention to language was intended to lay out the means of preventing the common pseudo-rationalizations that Neurath saw as the bane of genuine scientific inquiry; here, it would appear, to provide a more sure footing for an empirical sociology.

And yet in some ways there is an unmistakable subtext in this endeavor: while the text addresses primarily sociology, if in a manner embracing other disciplines, Neurath displays a strong need to highlight the failings, or at least the serious limitations, of economics as a scientific discipline. This should not come as surprising, since from the inception of the encyclopedia project in the mid-1930s Neurath had seen "economic theory" as having "its own place" in the project (Becchio 2013, p. 151).

If one compares the references in the 1910 and 1944 pieces, which serve as bookends to Neurath's effort to lay out the general terms of a theory of the social sciences, there is some overlap among the economic thinkers represented. Among those who do reappear are Jeremy Bentham, Pareto, Weber, Wilhelm Neurath (Neurath's father, an economic historian), and Jean de Sismondi. Two figures of note from the interwar period surface only in the later piece: Henry Schultz and Lionel Robbins. Both appear at critical junctures in Neurath's critique, with Schultz viewed more favorably than Robbins. Neurath appeared to give some approbation to Schultz's attempt to bridge economic theorizing about consumer demand and the use of mathematical constructions, including econometric ones, with a mass of statistical evidence, an unspoken reconciliation of the conventionally posed sides in the Methodenstreit. Nonetheless, Neurath also pressed on what he saw as Schultz's lack of full grounding of the correlations made, in essence calling into question the scientific basis for the use of econometrics. Robbins was viewed more critically. Neurath was derisive of Robbins's attempt to characterize macroeconomic measure

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

like national income as "conventions," while treating them at the same time as standard measures in economics.

In the 1944 monograph Neurath challenged once more the presumption that economics was a science from the perspective of the philosophy of science, invoking again the lead provided by Mach, Duhem, and Poincaré in physics, but focusing upon the rhetoric and the complexities presented by the use of language in social interactions (Neurath 1944, pp. 37–38).

Moreover, while framed as a critique of the 'Scientific Procedures in Sociology,' Neurath's text attends largely to the flaws in economics as a discipline. Neurath saw economics as often taken—mistakenly—to be scientific, where "the empiricist character of statements" in the field is deemed sufficient to offer up "a comprehensive scientific analysis." By contrast, Neurath identified the bulk of what constitutes economics as rooted in tradition and history through the practice of "the systematized transfer of certain traditional institutions" (Neurath 1944, p. 38).

Neurath then clarifies what this distinction portends in limiting the scientific scope of the discipline, differentiating "a scientific investigation" from "a systematized, i.e., scientifically supported, transfer of traditions" (Neurath 1944, p. 38).

Moreover, this in turn becomes a more extended disquisition on the use of language and its implications for economics, where the expressions used represent "a kind of old folklore" or "speech customs" (Neurath 1944, pp. 38–39). As an example he notes: "One speaks of the 'cost' of a production and goes on using this expression not only in our bookkeeping departments but also in social analysis" (Neurath 1944, p. 39).

Neurath then lays out the broader challenge by setting the "uneasiness" over economic "phraseology" in historical perspective, detailed in an extended note critiquing an array of economic thinkers:

> Very characteristic are the defects in the whole terminological approach made by Malthus, *The Principles of Political Economy* (2d ed., 1836), pp. 21, 47; in Richard Whately's *Elements of Logic* a great many of the 'ambiguous terms' in his appendix are economic ones, a topic on which the Archbishop also lectured. L. M. Fraser, in *Economic Thought and Language* (London 1937), depicts the situation without suggesting a way out. Others criticize the terminological situation too (e.g., P. Sargent Florence, *Uplift in Economics* [London, 1929], and in other writings). Marshall and others try to justify what they call 'elasticity' in the use of terms (*Money Credit and Commerce*) [London, 1929], (p. 13). (Neurath 1944, p. 49)

VII. ADVANCING TO A LATE TWENTIETH-CENTURY SETTING

One might look to aspects of Neurath's unorthodox or heretodox views about the nature of the social sciences, including economics, that prefigure critiques and countervailing approaches that came to the fore only decades later.

It is certainly the case that Neurath's long-standing concern that economics had to capture and measure life situations rather than the prices and quantities of goods bought and sold, or, for that matter, a construction like national income, has a real resonance with the critique of traditional economic measures advanced by Amartya Sen (Lessmann 2008, pp. 115–130) or advocates of an alternative index for gauging national economic well-being like Jean-Pierre Fitoussi and his collaborators.

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

There are other ways in which Neurath offers up a distinctive critique of economics, along with other social sciences, through his emphasis upon the need to "analyz[e] the science of language" (Neurath 1931b, p. 619). Moreover, his notion of the overriding role of hypotheses of varying sorts in arranging and explaining the 'facts' within any discipline represents an earlier version of what has come to be known as the "metanarrative," which gained significant attention as part of a general 'linguistic turn' across various disciplines in the 1970s. Within economics the potential relativism associated with these ideas drew heavily from philosophers of science like David Bloor (Bloor 1976).

This continued in the 1980s with a heightened emphasis upon, variously, 'economic discourse,' 'the rhetoric of economics,' or 'the conversation among economists' in academic circles through the work of such figures as Deirdre McCloskey, Arjo Klamer, Warren Samuels, and Willie Henderson, among others. This linguistic turn in economics drew upon a seemingly new awareness of the role that language, literary figurations like metaphor, and narratives played in shaping the nature of economic thought, and arose at the same time as a greater interest in, and more formalized treatment of, economic methodology emerged. As a late twentieth-century intellectual current, it was predicated on a distancing from, even an outright rejection of, what was supposed to be the reigning philosophical outlook of the preceding period in the twentieth century: positivism. Oftentimes this new current was associated with its own version of relativism, as multiple narratives, each potentially valid in its own terms, were seen as superseding the singular, dominant narrative of positivism.

Yet it was Neurath, one of the major figures in the logical positivist movement, who made the case for pluralism decades before. In his 1944 essay, essentially a critical disquisition on the foundations of sociology and economics, he wrote: "[W]e should not overlook that even the simplest report [whether appearing in physics or the social sciences] is based on hypotheses and, therefore, pluralist" (Neurath 1944, p. 14).

In fact, early on Neurath had expressed the concern that theoretical advances—and here he focused upon a physical science like physics—depended upon the construction of different "systems of hypotheses," stating: "As we require theories in order to order facts, so we require theories in order to order theories" (Neurath 1914–15, p. 101). The linguistic turn in Neurath's approach is also tied to his anti-foundationalism. Throughout his career Neurath saw all "statement[s] about the world" as necessarily deriving their meaning from an unbounded network of statements in which they were embedded. So, in an early essay entitled "The Lost Wanderers of Descartes," published in 1913, Neurath stated: "It is absolutely impossible to formulate a single statement about the world without making tacit use at the same time of countless others. Also we cannot express any statement without applying all of our preceding concept formation" (Neurath [1913] 1983, p. 3). Then, in "The Orchestration of the Sciences by the Encyclopedism of Logical Empiricism," published posthumously in 1946, Neurath struck a similar chord: "We do not discuss 'isolated' items in chemistry, geology, or history, but every item is, as it were, an element of a 'cosmic aggregation'" (Neurath [1946] 1983, p. 232).

He then elaborated upon the implications of this 'aggregational attitude,' contending that the limitations to prediction and predictability in science extended beyond "our incomplete knowledge of the situation," and rather inhered within the unbounded quality and connectivity of all statements and concepts (Neurath [1946] 1983, p. 232).

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

Here, Neurath rebuffs any claims by scientists of the possibility of omniscience, ascribing that notion to the "absolutism of Laplace" (Neurath [1946] 1983, p. 232); rather, the unbounded quality and connectivity of all statements and concepts necessitate a continuing state of incompleteness, contradiction, and lack of full clairvoyance (see also Neurath 1938, pp. 20–21).

Moreover, Neurath found greater stability in the terms found in everyday language than in scientific theories. But, as such terms are intended to capture essentially indeterminate concepts of everyday life, they do not lend themselves readily to prediction (Neurath [1936] 1983, p. 150).

Similarly, Neurath, following suit with Philipp Frank's conventionalist critique from the days of the First Vienna Circle (Frank 1949, pp. 53–60; see also Uebel 2000, p. 68), challenged the false mold of causality formed by the language of cause and effect. Again, this becomes a matter of language for Neurath, as he relates it to an 'asymmetry of expressions.' rooted in the 'asymmetry of our speaking and writing.' and sees it manifested in both scientific and everyday terminological contexts. (Neurath 1944, p. 21).

Neurath extended his critique of the use of causation terminology to "Marxist literature" for what he called its "strange" prioritizing of substructure and superstructure (Neurath 1941, p. 142). In addition, he rejected as a form of "absolutism" the use of "terms which speak of certain 'standards'" (Neurath 1941, p. 142), singling out in particular Weber and the use of "ideal type terms" (Neurath 1941, pp. 142–143).

But it is also the case that Neurath retained the belief that such underdetermination and multiplicity of interpretations were not inconsistent with, indeed were essential to, establishing the unity of science (Reisch 1997a, p. 457), which effort fell within the purview of Neurath's lifelong campaign to advance an anti-metaphysical conception of the world. Moreover, unlike much of the discussion about the rhetoric of economics that ensued in the 1980s and after, there was no tension in Neurath's conception between style and substance, evident, by contrast, in the criticisms leveled by Robert Solow (Solow 1988) and Robert Heilbroner (Heilbroner 1988).

Because Neurath did not conceive of this linguistic critique as riven by style and substance, the linguistic turn he set forth was in many ways more far-reaching and radical than that which emerged four decades later. After all, Neurath was calling into question the conceptual foundations of economic theory through it. As he stated in the 1944 monograph, what may appear to be, and is routinely presented as, a science is lacking as such in fundamental ways, for it turns out to be in actuality a less than fully systematized set of concepts couched in often ambiguous language grafted from customary practices, though not acknowledged as such. Thus, this was less the revelation that economics depended upon metaphors in its formation of concepts or constituted a discourse and more an examination of the flawed structure of economic ideas when built upon a precarious or even illusory linguistic foundation.

What might Neurath's critique of the language of economics portend for any reconsideration or re-examination of economic thought today? There are several strands that might be worth pursuing. For one, there is the continuing challenge of the fuzziness of economic concepts resulting from the incomplete 'sorting' of terminology that Neurath identified as far back as 1910. While Neurath gave primary attention to the ambiguity and haziness of terms like 'capital,' one might readily extend such discussion to the difficulties attendant upon the use of 'saving' and 'investment,' and, for that matter, 'national income' as well.

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

This in turn folds into a second line of inquiry. To what extent has the formation of concepts in economics occurred on an ad hoc basis, without sufficient effort to establish their connectivity—that is, their relation to one another—in a more systematic way (even allowing for the fact that none of them, in Neurath's view, can be comprehended as anchoring)?

Third, that connectivity may depend upon "reasonable knowledge of [their] historical conditions," as Uebel has phrased it (Cartwright et al. 1996, p. 126). This would capture and account for the impact upon, and the shaping of, concepts Neurath deemed as drawn from bookkeeping or accounting practices or from folklorist tradition. At the least it would suggest the need for delving into the historical context in which the language of economic concepts is formed in order to achieve a greater measure of the 'scientificality' of economics, which Neurath found so elusive.

VIII. EPILOGUE: MODERNIST OR POSTMODERNIST?

How far does any such prefiguration go? A reassessment of Neurath's thought in recent decades has led to a greater emphasis upon his anti-foundationalism and 'naturalistic epistemology,' reweighting his role as a positivist in far more ambivalent terms. Thomas Uebel cast this revised view of Neurath as 'overcoming logical positivism from within' (Uebel 1992).

To what extent does this break down the barriers between modernism and postmodernism?

In "The Genealogy of Postmodernism," published in 2001, Deirdre McCloskey advances the portrayal of Otto Neurath as the embodiment of modernism leading the charge for the imposition of a form of social engineering in all matters of intellectual inquiry, referring to Neurath as one of the "bossy genius[es]" of modernism (McCloskey 2001, p. 108). McCloskey depicted Neurath scornfully as "subordinat[ing] everyone to his conveniently brief plan, ... us[ing] a claim of transcendence to batter the opposition" (McCloskey 2001, p. 109).

One might point to Neurath's St.-Simonian evocation of the new age of the 'sociological organizer' replacing that of the 'priest' in his short piece "Physicalism" in *The Monist* in support of McCloskey's claim of Neurath's modernism (Neurath 1931b, p. 622).

Yet it was also the case that in his own writings Neurath gave great weight to the role of pluralism and anti-absolutism, including in this same article: "All [those following in the footsteps of Mach, Poincare, and Peano] reject anything that smacks of the 'absolute'. . . ." (Neurath 1931b, p. 619). He emphasized the underdetermination of facts and the consequent requirement for multiple interpretations, based upon varying hypotheses. This might readily be translated into the multiple paradigms routinely associated with the ideas of Thomas Kuhn and the methodological critique of Paul Feyerabend[8] or the metanarratives of the linguistic turn itself. In fact, Kuhn's

[8]Rudolf Haller made the following connection between Neurath and Feyerabend: "Neurath shares with Paul Feyerabend the view that basic elements of the scientific world-conception are already contained in magical practices; . . . but Neurath already published these views nearly 50 years ago . . . " (Haller 1991a, p. 35).

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

The Structure of Scientific Revolutions was part of the same series of monographs as Otto Neurath's "Foundations of the Social Sciences," namely the *International Encyclopedia of the Unified Sciences*.

George Reisch argues strongly that Neurath's case was fundamentally modernist, in that all his challenges to the possibilities of prediction in science and his evocation of the rough edges of complexity found in 'aggregations' were all in the service of the 'unity of science,' rather than the postmodernist 'disunity' adumbrated by John Dupré (Reisch 1997a). Even so, Reisch does note a certain resonance between Neurath's outlook and that of leading late twentieth-century thinkers often labeled as postmodern. For example, Reisch sees shades of Neurath's anti-Cartesianism in "Foucault['s] problematiz[ing of] the notion of an 'author'" (Reisch 1997b, p. 472). Also, one cannot overlook Neurath's emphasis upon "incompleteness" in conceiving of science as an encyclopedia, containing conflicting narratives. There is a way to reconcile these seemingly contradictory pulls without grievously distorting the thrust of Neurath's work and ideas. Adapting an approach and understanding suggested by the *Annales* school of historians, especially Lucien Febvre, one might posit that the intellectual discourse of the early twentieth century would never have contemplated or contained the kind of disintegrative relativism, overturning any and all standards, associated with late twentieth-century postmodernism. But one can also posit the evolution of ideas, including in the history of economic thought, whereby older ways of thinking or tenets of schools of thought are carried forward, remixed, intertwined, or even revived in newer ways that may bear striking similarities and, as the frame of reference for intellectual discourse shifts, also hold differences with that which was espoused by an earlier generation.

Thus, while postmodernist ideas would have seemed anachronistic—out of time—in the first decades of the twentieth century, Neurath's conventionalism clearly presaged key elements of the postmodernism of the linguistic turn in economics in the late twentieth century. These include the necessity of treating economic subjects as a matter of narrative, the recognition of the multiplicity—and lack of congruence, even the "incompleteness"—of such narratives, and the centrality of an inquiry into the language of economics to establish its validity as a field, or critique its failings in that regard.

REFERENCES

Balabkins, Nicholas W. 1978. "*Der Zukunftsstaat:* Carl Ballod's Vision of a Leisure-Oriented Socialism." *History of Political Economy* 10 (2): 213–232.

Bauer, Otto. 1919. *Der Weg zum Sozialismus*. Wien: Ignaz Brand.

Becchio, Giandomenica. 2005. "Two Heterodox Economists: Otto Neurath and Karl Polanyi." Working paper No. 11. Centro di Studi sulla Storia e I Metodi dell'Economia Politica (CESMEP).

———. 2013. "Economics in the International Encyclopedia of Unified Science." *History of Economic Thought and Policy* 2: 145–156.

Bloor, David. 1976. *Knowledge and Social Imagery*. London: Routledge and K. Paul.

Cartwright, Nancy, Jordi Cat, Lola Fleck, and Thomas Uebel. 1996. *Otto Neurath: Philosophy between Science and Politics*. Cambridge: Cambridge University Press.

Chaloupek, Gunther K. 1990. "The Austrian Debate on Economic Calculation in a Socialist Economy." *HOPE* 22 (4): 659–675.

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

Frank, Philipp. 1941. *Between Physics and Philosophy*. Cambridge, MA: Harvard University Press.

———. 1949. *Modern Science and Its Philosophy*. Cambridge: Harvard University Press.

Haller, Rudolf. 1991a. "History and the System of Science in Otto Neurath." In Thomas Uebel, ed., *Rediscovering the Forgotten Vienna Circle*. New York: Springer, pp. 33–40.

———. 1991b. "The First Vienna Circle." In Thomas Uebel, ed., *Rediscovering the Forgotten Vienna Circle*. Dordrecht: Springer, pp. 95–108.

———. 1993. *Neopositivismus*. Darmstadt: Wissenschaftliche Buchgesellschaft.

Hayek, Friedrich A. 1935. "The Nature and History of the Problem." In F. A. Hayek, ed., *Collectivist Economic Planning*. London: G. Routledge, pp. 1–40.

———. 1994. *Hayek on Hayek: An Autobiographical Dialogue*. Edited by Stephen Kresge and Leif Wenar. London: Routledge.

Heilbroner, Robert. 1988. "Rhetoric and Ideology." In Arjo Klamer, Donald N. McCloskey, and Robert M. Solow, eds., *The Consequences of Economic Rhetoric*. Cambridge: Cambridge University Press, pp. 38–43.

Heinrich, Richard, Elisabeth Nemeth, Wolfram Pichler, and David Wagner, eds. 2011. *Image and Imaging in Philosophy, Science and the Arts*. Volume 2. New Brunswick, NJ: Ontos verlag.

Hodgson, Geoffrey, 1997. "The Fate of the Cambridge Capital Controversy." In Philip Arestis, Gabriel Palma, and Malcolm Sawyer, eds., *Capital Controversy, Post-Keynesian Economics*. London: Routledge, pp. 95–110.

Leonard, Robert J. 1999. "'Seeing is Believing'. Otto Neurath, Graphic Art, and Social Order." *History of Political Economy* 31 (4): 452–478.

Lessman, Ortrud. 2008. "A Similar Line of Thought in Neurath and Sen: Interpersonal Comparability." In E. Nemeth et al., eds., *Otto Neurath's Economics in Context*. Dordrecht: Springer, pp. 115–130.

McCloskey, Deirdre M. 2001. "The Genealogy of Postmodernism: An Economist's Guide." In Stephen Cullenberg, Jack Amariglio, and David F. Ruccio, eds., *Postmodernism, Economics and Knowledge*. London: Routledge, pp. 102–128.

Mises, Ludwig. 1920. "Die Wirtschaftsrechnung in sozialistischen Gemeinwesen." *Archiv fur Sozialwissenschaften und Sozialpolitik* 47 (1): 86–121.

Nemeth, Elisabeth. 2008. "'Freeing up One's Point of View': Neurath's Machian Heritage Compared with Schumpeter's." In *Otto Neurath's Economics in Context*. Dordrecht: Springer, pp.13–36.

Nemeth, Elisabeth, Stefan W. Schmutz, and Thomas Uebel, eds. 2008. *Otto Neurath's Economics in Context*. Dordrecht: Springer.

Neurath, Marie. 1973. "University Days in Berlin." In Marie Neurath and Robert S. Cohen, eds., *Empiricism and Sociology by Otto Neurath*. Translated by Paul Foulkes and Marie Neurath. Dordrecht: Reidel, p. 7.

Neurath, Otto. [1910] 2004. "On the Theory of Social Science." In Thomas E. Uebel and Robert S. Cohen, eds., *Otto Neurath: Economic Writings/Selections 1904–1945*. With multiple translators. Dordrecht: Kluwer Academic Publishers, pp. 265–291.

———. 1911. "Nationalokonomie und Wertlehre, eine systematische Untersuchung." *Zeitschrift fur Volkswirtschaft, Sozialpolitik under Verwaltung* 20: 52–115.

———. [1913] 1983. "The Lost Wanderers of Descartes and the Auxiliary Motive." In Robert S. Cohen and Marie Neurath, eds. and transl., *Philosophical Papers 1913–1946*. Dordrecht: D. Reidel Publishing Company, pp. 1–12.

———. [1914–15] 1981. "Zur Klassifikation von Hypothesen systemen." In Rudolf Haller and Heiner Rutte, eds., *Gesammelte philosophische und methodologische Schriften*. Volume 1. Wien: Holder-Pichler-Tempsky, pp. 85–101.

———. [1920] 2004. "Total Socialisation." In Thomas E. Uebel and Robert S. Cohen, eds., *Otto Neurath: Economic Writings: Selections 1904–1945*. With multiple translators. Dordrecht: Kluwer Academic Publishers, pp. 371–404.

———. 1931a. *Empirische soziologie*. Wien: J. Springer.

———. 1931b. "Physicalism: The Philosophy of the Vienna Circle." *The Monist* 41 (4): 618–623.

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377

———. 1935. *Was bedeutet rationale Wirtschaftsbetrachtung?*. Wien:Verlag Gerold & Co.
———. [1936] 1983. "Encyclopedia as 'Model'." In Robert S. Cohen and Marie Neurath, eds. and transl., *Philosophical Papers 1913–1946*. Dordrecht: D. Reidel Publishing Company, pp. 145–158.
———. 1938. "Unified Science as Encyclopedic Integration." In Otto Neurath, Rudolf Carnap, and Charles Morris, eds., *International Encyclopedia of Unified Science*. Volume 1, numbers 1–5. Chicago: University of Chicago Press, pp. 1–27.
———. 1941. "Universal Jargon and Terminology." *Proceedings of the Aristotelian Society* 41 (New Series): 127–148.
———. 1943. "Planning or Managerial Revolution?" *New Commonwealth Quarterly*: 148–154.
———. 1944. *Foundations of the Social Sciences*. Chicago: University of Chicago Press.
———. [1945] 2004. "Alternatives to Market Competition." In Thomas E. Uebel and Robert S. Cohen, eds., *Otto Neurath: Economic Writings/Selections 1904–1945*. With multiple translators. Dordrecht: Kluwer Academic Publishers, pp. 546–548.
———. [1946] 1983. "The Orchestration of the Sciences by the Encyclopedism of Logical Empiricism." In Robert S. Cohen and Marie Neurath, eds. and transl., *Philosophical Papers 1913–1946*. Dordrecht: D. Reidel Publishing Company, pp. 230–242.
Neurath, Otto, and Anna Schapire-Neurath. [1910] 1913. *Lesebuch der Volkswirtschaftslehre*. Second edition. Leipzig: G.A. Gloeckner.
O'Neill, John. 1999. "Ecology, Socialism and Austrian Economics." In E. Nemeth and R. Heinrich, eds., *Otto Neurath: Rationalitat, Planning, Vielfalt*. Vienna: Weiner Reihe, pp. 123–145.
———. 2004. "Ecological Economics and the Politics of Knowledge: The Debate between Hayek and Neurath." *Cambridge Journal of Economics* 28: 431–447.
Poincaré, Henri. 1906. *Wissenschaft und Hypothese*. Authorized German edition with explanatory noes by F. and L. Lindemann. Second improved edition. Leipzig: B.G. Teubner.
Reisch, George. 1997a. "How Postmodern Was Neurath's Ideas of Unity of Science?" *Studies in History and Philosophy of Science Part A* 28 (3): 439–451.
———. 1997b. "Economist, Epistemologist ... and Censor? On Otto Neurath's Index Verborum Prohibitorum." *Perspectives on Science* 5: 452–480.
Solow, Robert. 1988. "Comments from Inside Economics." In Arjo Klamer, Donald N. McCloskey, and Robert M. Solow, eds., *The Consequences of Economic Rhetoric*. Cambridge: Cambridge University Press, pp. 31–37.
Tribe, Keith. 1995. *Strategies of Economic Order: German Economic Discourse, 1750–1950*. Cambridge: Cambridge University Press.
Turk, Michael. 2006. "The Fault Line of Axiomatization." *European Journal of the History of Economic Thought* 13 (2): 195–212.
———. 2012. "The Mathematical Turn in Economics: Walras, The French Mathematicians, and the Road Not Taken." *Journal of the History of Economic Thought* 34 (2): 149–167.
Uebel, Thomas E. 1992. *Overcoming Logical Positivism from Within*. Amsterdam: Rodopi.
———. 1996. Normativity and Convention. In E. Nemeth and F. Stadler, eds., *Encyclopedia and Utopia: The Life and Work of Otto Neurath*. Amsterdam: Kluwer, pp. 97–112.
———. 2000. *Vernunftkritik und Wissenschaft: Otto Neurath und der erste Wiener Kreis*. Wien: Springer-Verlag.
———. 2004. "Introduction." In *Otto Neurath: Economic Writings Selections 1904–1945*. Dordrecht: Kluwer Academic Publishers, pp. 1–108.
Vossoughian, Nader. 2011. *Otto Neurath: The Language of the Global Polis*. Rotterdam: Nai Publishers.

Downloaded from http:/www.cambridge.org/core. SOAS - University of London, on 03 Oct 2016 at 09:50:26, subject to the Cambridge Core terms of use, available at http:/www.cambridge.org/core/terms. http://dx.doi.org/10.1017/S1053837216000377